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Electrical Contracting

September 1934

With Which Is Consolidated
The Electragist and Electrical Record

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WIRING SYSTEMS
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Pittsburgh, Pa.

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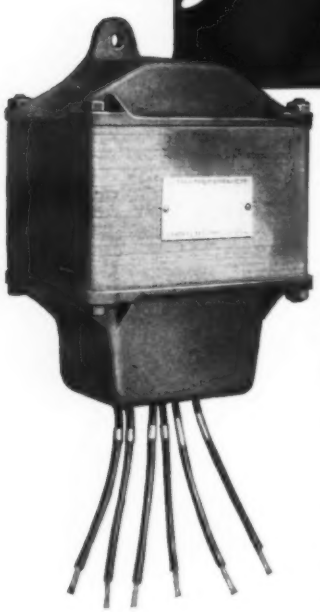
THERE'S PROFITABLE BUSINESS IN G-E SPECIALTY TRANSFORMERS

for

INDUSTRIAL HEATING
WELDING AND BRAZING
TESTING
AUTOMATIC CONTROL
RECTIFIERS
ELECTRIC ARCS



It's small
Easily installed
Put it anywhere
No inspection
No maintenance

G-E SPECIALTY transformers provide the most economical method of obtaining the right voltage for such applications as those listed above, and for sign lighting, airport lighting, operation of 32-volt portable lamps and tools, etc.

These transformers are economical to operate because of their high efficiency. They are easy to install and, being compact, may be placed anywhere; require no fireproof vaults, since they are air-cooled; and are neat in appearance. Service records show that they need practically no inspection or maintenance.

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We don't say bring your time-switch "problem" to us. On the contrary, make no problem of it. Order a time switch from the G-E Supply Corporation (you will receive it promptly), install it, and forget it. If you would like further information, call the nearest Supply Corporation or G-E sales office, or mail the attached coupon.

GENERAL ELECTRIC

General Electric Company
Dept. 6R-201, Schenectady, N. Y.

Time Switches ☐ Air-cooled Transformers ☐

Please send me descriptive and application data on the products I have checked above.

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Firm.....

Street.....

City..... State..... 320-33

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VOLUME 33
NUMBER 11

electrical contracting

WITH WHICH IS CONSOLIDATED ELECTRICAL RECORD
S. B. WILLIAMS, EDITOR AND GENERAL MANAGER

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Opportunity knocks for

RCA Victor *Sound Systems*

HOTELS HAVE JOINED THE UPWARD TREND

Reports by the score, from reliable sources, predict that this fall and winter will bring the most prosperous days that hotels have had for many a year. And, believe it, when hotels are in the money, they buy. No other field is more aware of the value of improvements in equipment and service.

RCA Victor Sound Systems have always enjoyed an immense popularity in hotels of the nation. With business revival, an important part of the money spent will be on RCA Victor Sound Systems... and the contractor allied with RCA Victor will stand to profit substantially.

Scores of hotels are now using RCA Victor Centralized Radio with satisfaction and profit. The need for this service is universally recognized and the traveling public demands it. These jobs mean real profit from the installation as well as the sales standpoint. Then, RCA Victor Public Address equipment does duty in paging systems, and in many a ballroom, roof or beer garden and restaurants, it fully answers the demand for highly efficient, inexpensive amplifying equipment. So, there's your opportunity: a group of intelligent prospects, with money to spend...a constantly increasing need for high quality sound equipment ...and RCA Victor equipment for any job of music or voice reproduction at the right price. Go to it —and rely upon our willingness to help with the sales or engineering problems that you meet,

RCA VICTOR CO., Inc.

A Radio Corporation of America Subsidiary

CENTRALIZED SOUND SECTION, CAMDEN, NEW JERSEY

Send for illustrated booklet on RCA Victor Portable Public Address Equipment. Ask also for information relative to Hotel Centralized Radio.

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Address _____

City _____ *State* _____

- ☐ Centralized Radio
- ☐ Sound Reenforcing
- ☐ Simplified Antenna Systems
- ☐ Public Address

Customer Discounts

IN approaching the problem of securing adequate compensation for the electrical contractor in the sale of electrical materials, associations in various parts of the country demanded a spread of 20 per cent for the contractor. In making this demand the contractor had in mind not so much the figure of 20 per cent as the necessity for securing a discount which would permit him to sell the user at a profit.

FOR months a committee of manufacturers, wholesalers and contractors have been wrestling with the problem of contractor compensation. It has not been easy because it was evident in the very beginning that some basis other than a flat percentage had to be found.

Perhaps the most progress was made when the most obvious thing was made the basic principle, namely that the ultimate user should be recognized as the consumer regardless of size or purchasing power.

The joint committee had previously gone on record as recognizing that the electrical contractor performs a service in the distribution of electrical materials and that this service should receive a compensation. When these two principles are put together it should be obvious that the solution of this problem is not a long way off.

While it is probably true that many electrical contractors feel they should be able to sell industrial plants regardless of their size, it must be remembered that the electrical contractor, in order to secure compensation for his services, must do compensatable work. In other words, an electrical contractor buying in small quantities should not be able to sell at a profit an industrial customer who buys in much larger quantities.

The principle of recognition of the user as the ultimate consumer sets his purchases down on the retail basis with discounts based on quantity. Behind him comes the contractor with a discount from the list price in recognition of his sales service with further discounts based on volume. In this fashion the customer is treated fairly and the contractor, who is in a position to render that customer service, receives a just compensation.

WITHIN the last few weeks discount sheets have gone out from manufacturers embodying these principles. It is expected that many more manufacturers will do likewise in the near future. Under the code as now written, it is not going to be possible to set up these principles as a matter of a Code of Fair Competition. Individual manufacturers, however, may write their own price schedules and differentials to embody these principles. When such a schedule is filed with their Code Authority it becomes binding on that manufacturer.

The manufacturers, of course, are going to be very much interested in seeing the extent to which contractors show their appreciation to those manufacturers that have set up price schedules involving these principles. If the contractors have been sincere in their demand for a recognition of their part in distribution they will give evidence of that sincerity in their support of manufacturers that have developed a price schedule conforming to that demand.

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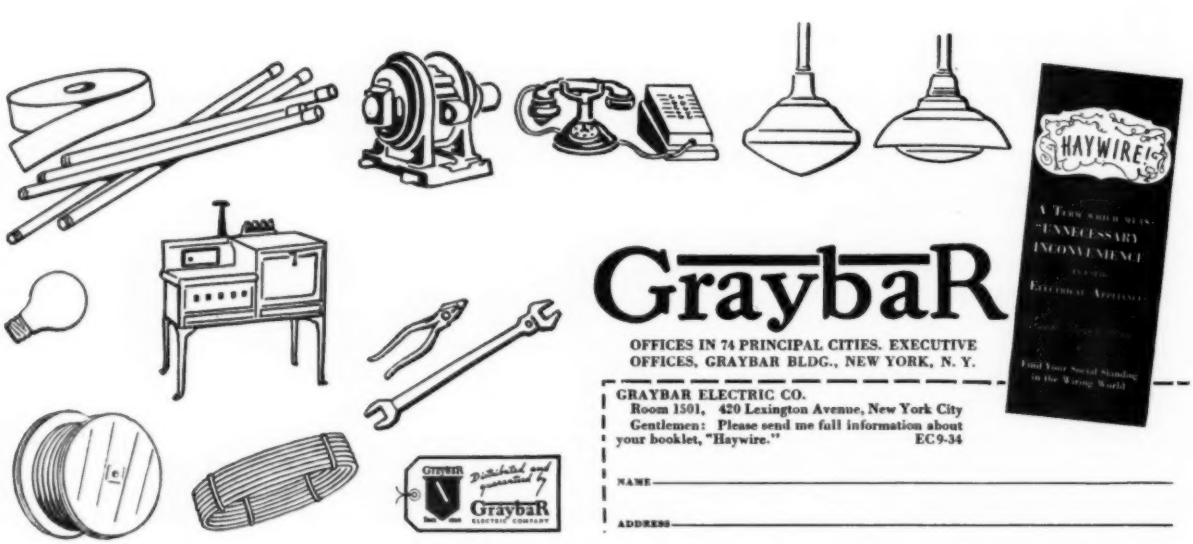
$500,000,000

FOR REMODELING AND REPAIRS IN 1934 ...$1,500,000,000 BY JANUARY 1, 1936

The Government expects more than $500,000,000 will be loaned this year for repairs and remodeling under the National Housing Act. $1,500,000,000 is expected to be loaned by January 1, 1936. ¶ How much of this business will go to the electrical contractor? . . . The answer depends entirely on how aggressively the contractor goes after this opportunity. ¶ Remodeling will be given wide publicity. Government support is making the funds available. But it is up to the electrical contractor to *sell* specific electrical remodeling jobs. Sell the *conveniences* and the *safety* of more up-to-date wiring installations. ¶ To help you with your selling job, Graybar has prepared an unusually interesting booklet, "Haywire." In simple language, it explains to prospective customers some of the mysteries of home wiring—and why one should have *better* wiring. Ask us about it. Write us now . . . or mail the coupon below.



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Gentlemen: Please send me full information about your booklet, "Haywire." EC9-34

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WITH WHICH IS CONSOLIDATED ELECTRICAL RECORD

VOLUME 33
NUMBER 11

SEPTEMBER
1934

TANGLES

BY JOHN WISE

My friend Babbitt and his wife love flowers, especially vines, and every summer their fences are almost hidden by moonflowers, morning glories and other creepers. Now, the only way you can get full coverage and a neat job is to train the vines on strings or wires. Babbitt's climbers were managed like his business, in an orderly, symmetrical formation that provided a solid bank of green, dotted all over with blossoms.

But this year sickness and other things kept him from his beloved creepers until June, and the mess he found then reminded him of when he opened a coil of fish-steel without holding the ends. The vines and tendrils were one tangled snarl. In bunches of three to a dozen or more they were all tightly wrapped together like a telephone cable, presenting a decidedly ragged and unkempt appearance.

You see, in Winter all outside growth is stopped and no care is necessary. Then Spring comes, with rain and sun, and up come not only the new plants, but last Fall's volunteers from dropped seeds. Like other "social climbers" they try to grow straight up, but unless the trainer is on the job the vines will run hog-wild before you know it. This ganging up is wasteful and damaging to the whole job.

Before Babbitt got those wanderers straightened out, he could sympathize with Gen. Johnson, trying to keep several hundred codes in order. First, he had to unwind them from each other, one by one, and lay them out in position, then re-wind them on their respective strings. In the meantime there was great loss of life; what with pulling a bit too hard, turning too quickly and stepping on the tender shoots, the walks were littered with the dead and dying.

As an eyewitness to part of this re-organization, I couldn't help thinking of our electrical situation at present. We haven't any tangle yet—that's what we want to avoid. But we have passed through a period of semi-stagnation which, like Winter in the case of the vines, will be followed by rapid growth and hectic activity. Some of this will come from the seeds we've been planting in the form of advertising and salesmanship, some will be volunteer stuff from the customers, all of it will be more than welcome.

We cannot afford to just rub our hands and say: "Let it come, we'll eat it alive!" On the contrary, each contractor must see that the lines are ready to carry the business straight upward, without delay or confusion. So he should ask himself: "Is every department and person in my organization functioning properly and equipped to handle increased volume? Are my tools, transportation, records, stock and financial arrangements in perfect shape? What can I do and what do I need to jump in and secure my full share of the new business?"

An ounce of preparation is worth a ton of second-guesses.

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Wiring of World's Largest Distillery

IN designing the wiring system for Hiram Walker Company's new plant at Peoria, Ill., the first important distillery to be built since repeal of prohibition, the engineers had to be guided by new methods because explosion-proof wiring is a new requirement since the time when distilleries previously flourished.

Six hundred and thirteen motors totalling 5,174 h.p. and 1,450 lighting circuits totalling 826 k.w., controlled from 127 panelboards, were installed in the 18 building units which comprise what is claimed to be the largest distillery in the world. Four large future warehouse units are provided for as well in the underground feeder network.

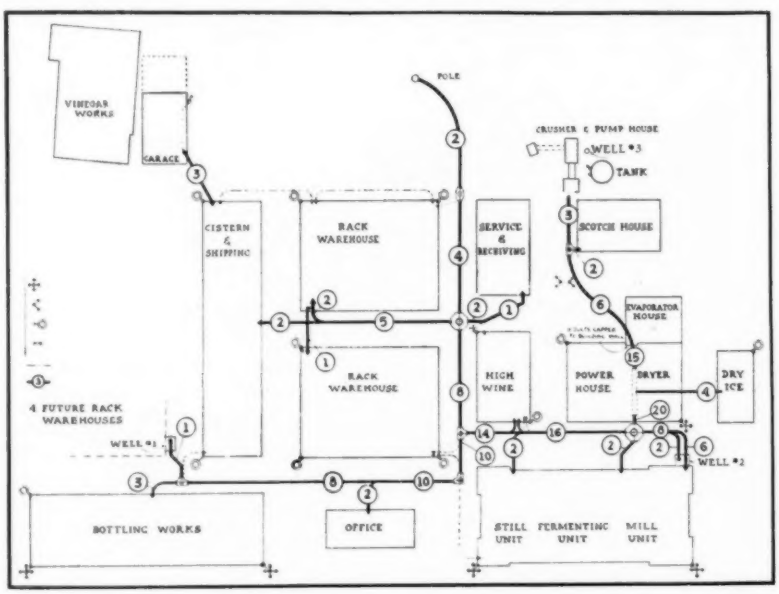
Such an extensive use of electric power under varying hazardous conditions required exacting conformity with Article 32 of the National Electrical Code to insure proper safeguards for the protection of life and property against the prevalent explosive hazards. Any area which was likely to contain a sufficient quantity of explosive vapors or dust to represent a possible source of danger was adequately safeguarded.

Smith, Hinchman and Grylls, Inc., of Detroit, Mich., architects and engineers, awarded the electrical contract for this plant to the Dearborn Electrical Construction Company, Chicago, Ill. While this contract amounts to approximately $300,000, it is interesting to note that temporary wiring costs were hold down to $8,000, despite the commencement of production in certain units prior to their actual completion. A peak crew of 160 men was employed for this job, divided into eight groups.

A modern power plant unit serves the building with electric power and processing steam. A separate building houses the coal crushing plant from which an inclined conveyor system supplies fuel to two 1800 h.p. boilers; two 1500 k.v.a. steam turbine-driven generators deliver 60 cycle 3-phase 440-volt current to a main feeder switchboard.

The main feeder switchboard is 90 ft. long and is made up of 21 feeder panels, each having one 600-amp. 3-pole solenoid operated feeder breaker; two panels each having three 3,000-amp. single-pole disconnect switches for incoming generator lines; one panel having three 1200-amp. single-pole disconnect switches for public service company's secondary feeders from 1,000 k.v.a. standby service transformer bank.

The generator control switchboard, located on operating floor, above main feeder switchboard is 20 ft. long, consisting of two generator control panels; two metering panels and three



FEEDER LAYOUT AND LOAD SCHEDULE

Description	V.C. Number	L.C. Feeders Size	—Power— No. Motors	Total H.P.	—Lighting— No. Circ.	Total Kw.	-Distr. Panels- Power	Lighting
Fire Pump	1	3-Cond. 250 M	1	150	..	..	..	..
Mill Building	2	3-Cond. 400 M	210	1500	100	75	3	9
	1	3-Cond. 600 M						
	2	3-Cond. 500 M						
Power House	1	3-Cond. 700 M	35	1360	126	87	5	7
	1	3-Cond. 600 M						
	1	3-Cond. 500 M						
	1	3-Cond. 700 M						
Dryer Building	1	3-Cond. 400 M	34	180	60	33	3	3
Coal Handling Building	1	3-Cond. 600 M	8	190	4	3	1	1
Well Pump No. 1	1	3-Cond. 250 M	1	150	..	..	1	..
Well Pump No. 2	1	3-Cond. 250 M	1	150	..	..	1	..
Well Pump No. 3	1	3-Cond. 250 M	1	150	..	..	1	..
Still Building	1	3-Cond. 600 M	42	260	88	50	2	8
Ferment Building	1	3-Cond. 300 M	12	20	48	50	1	4
Bottling Building	2	3-Cond. 500 M	110	300	300	187	7	17
Administration Building	1	3-Cond. 400 M	15	85	84	50	2	5
High Wine	1	3-Cond. 300 M	32	65	36	25	2	1
Service and Receiving Building			25	75	32	25	1	1
Cistern and Shipping Bldg.	1	3-Cond. 250 M	60	70	100	75	3	4
Rack Warehouse No. 1	1	3-Cond. 300 M	4	55	222	75	1	14
Rack Warehouse No. 2			3	50	222	75	1	14
Dry Ice Building	1	3-Cond. 600 M	15	360	16	8	1	1
Scotch House	2	3-Cond. 400 M	(Future Building Feeders)					
Garage	1	3-Cond. No. 6	5	4	12	8	1	1
Well House No. 2, Ground Wire	1	1-Cond. 2/0 R. C.	..	..	..	..	..	..
			614	5174	1450	826	37	90

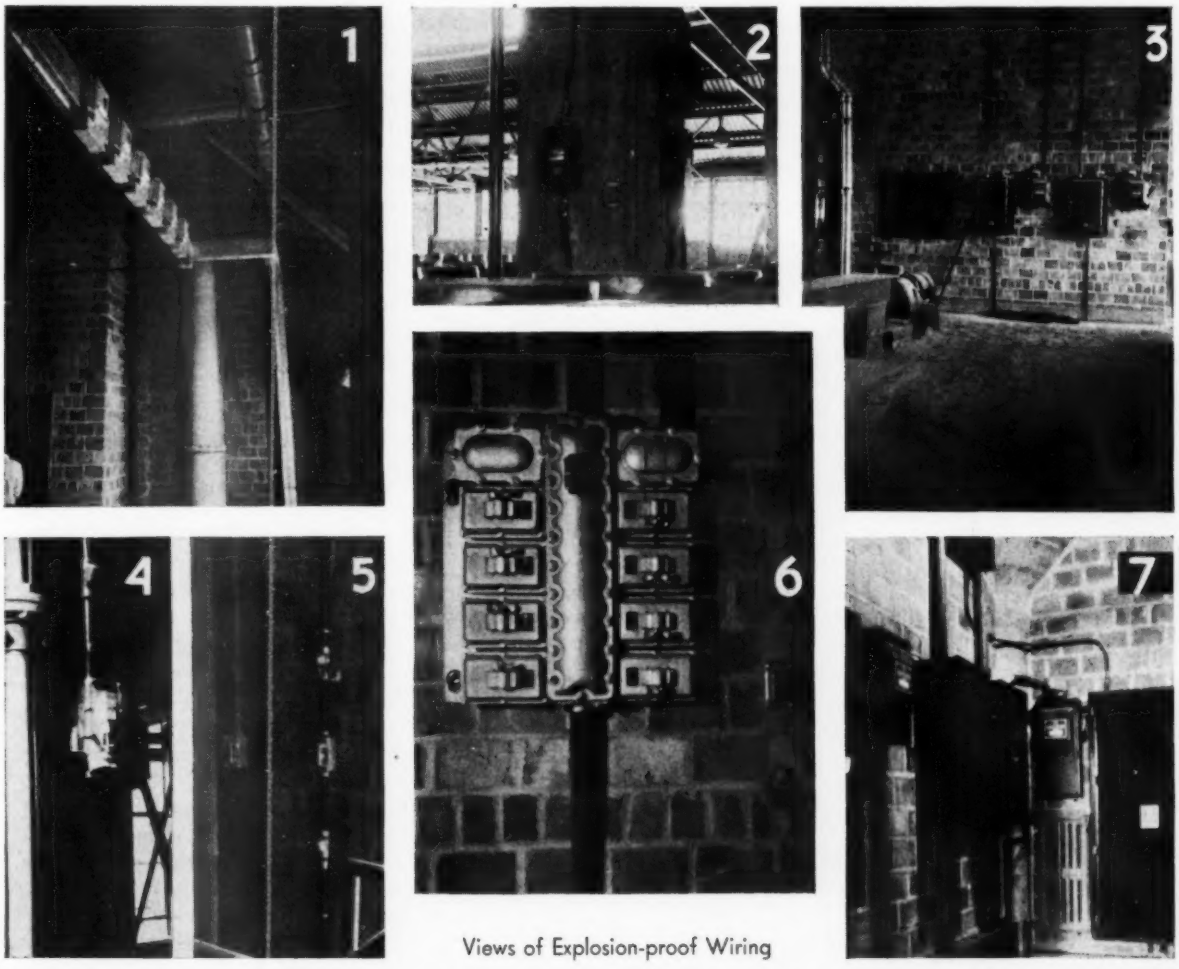
feeder control panels. The latter panels have mounted thereon remote operating switches for feeder control circuit breakers on main feeder switchboard, also switches and ammeters for measuring current in the phase wire of each feeder circuit.

A network of underground feeders was installed in a concrete encased fibre conduit system from main feeder switchboard to the various buildings, with manholes located in plant yard at most advantageous locations to facilitate cable installations. The main duct run leaving power house and feeding into first manhole is made up of twenty fibre conduits. Varnished cambric lead sheathed three-conductor cables were used, ranging in size up to 700,000 c.m.

A total of thirty-five 440-volt primary, 110/220-volt secondary lighting transformers ranging from 5 k.v.a. up to 75 k.v.a. supplied the lighting system and special 110-volt and 220-volt single-phase motors in this plant. Small transformers were hung outside of hazardous type buildings upon angle and channel iron racks.

In lighting the large areas between the buildings, nineteen 500-watt directional lighting units were mounted approximately 30 ft. above ground at street intersections, on corners of brick buildings. A special 3-in. diameter hollow galvanized steel gooseneck was assembled to two galvanized flat steel brackets for bolting to brick corner walls. This assembly supported the globe and receptacle housing. The housing also enclosed a 440-volt to 110-volt transformer, as these units were supplied from an underground 3-phase 440-volt yard lighting feeder, with units connected in balance on the phases. Conduit wiring connections were brought up in brick wall and stubbed out horizontally at exact corner of building and level with lower bracket. The lower bracket was provided with removable splicing chamber cover at under side.

Where high ceiling hazardous areas required good illumination values, a system of pipe suspended 500-watt explosion-proof units were installed. These units weighing 50 lbs. each were made of cast aluminum with ⅞ in. thick heat-resisting lens. All joints were made to a ground fit, without



Views of Explosion-proof Wiring

(1) Dust-tight bus feeder system in mill building showing riser in pipe well and six branch tap fittings in use on this section of system. (2) Explosion-proof motor switch in cistern building with flush tumbler switch alongside showing both exposed and concealed sealing fittings. (3) A group of explosion-proof motor control equipment for screw conveyors in mill building. (4) A Class I Group D 3-pole, 2-wire explosion-proof receptacle in still building. Note sealing fittting directly above. (5) Explosion-proof switches in still building showing sealing fittings above and below the feed-through switch outlets. (6) Explosion-proof circuit breaker panelboard in still building, eight connected circuits, two spares, 150-amp. main busses. Note explosion-proof flush switch at right with flush sealing fittings above and below switch fitting. (7) Enclosed panelboard in cistern and wine storage building from which power and lighting circuits are controlled.

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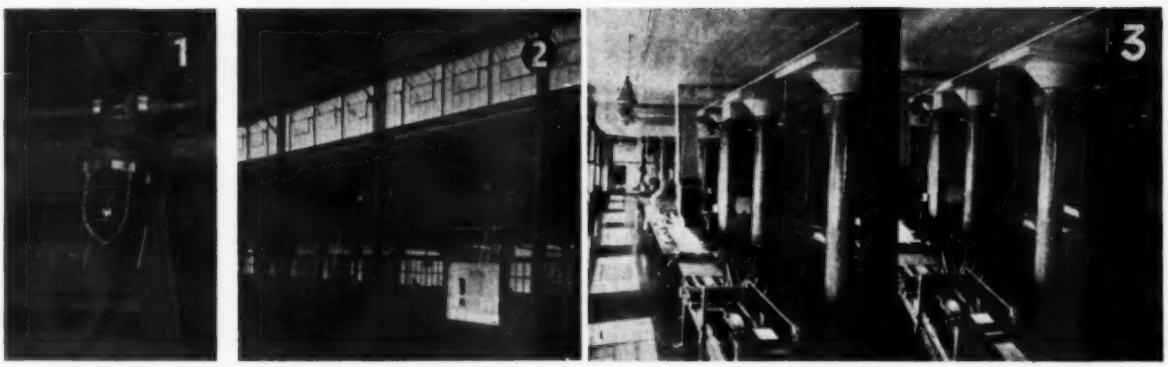


Explosion-proof Lighting

1—A typical explosion-proof fixture installation for 60-watt and 100-watt units in cistern building. 2—View of storage building showing high bay explosion-proof lighting units. 3—View of bottling department showing 500-watt explosion-proof lighting units.

gaskets being used and to withstand a 450 lb. hydraulic pressure test.

Exposed wiring methods prevailed in most buildings, with some exceptions. Conduits and various outlet fittings were secured by means of expansion shields, except where structural steel building members were drilled and tapped for supports. All conduits entering Class I areas from adjoining spaces were sealed off with approved sealing fittings of the same type as used in conduit runs connecting to wall switches and receptables. Where flush lighting switches or receptacles occurred, the sealing fittings were equipped with flush type adapter nozzles, projecting out from wall to permit the insertion of sealing compound.

Motor starters and other controlling equipment were mounted upon angle and channel iron frames adjacent to motor bases wherever such methods were available, making for greater safety and also definite installation economy.

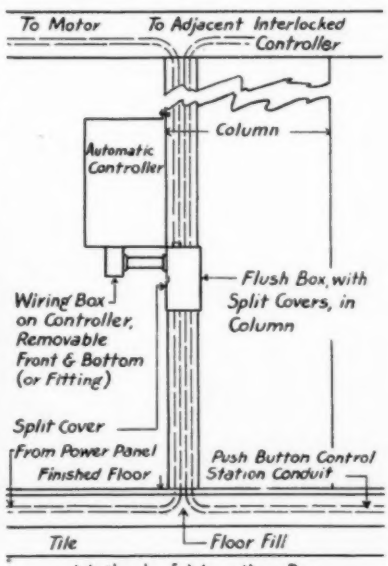
Locations for power and lighting distribution panelboards were isolated from hazardous areas in separate rooms wherever practicable. This practice affected some economy over providing explosion-proof types of equipment, as would be required if located within the hazardous working space, as well as reducing the possibility of hazards. In spaces where lighting panelboards were located in hazardous spaces, explosion-proof circuit breaker types were used.

Approximately 1,000 ft. of enclosed dust-tight bus feeder, ranging in size from 375-amp. to 750-amp. was used in the mill and still buildings for two hundred fifty-two 440-volt motors. Risers were located in pipe wells at which points tap bus feeders extended out horizontally into work spaces, near ceilings, to groups of motor starters. The bus bar enclosures were designed to permit branch tap connections being made to feeders at any desired intermediate point. After such taps were made motor circuit conduits were extended therefrom to the desired motor starters. Rod hanger supports secured in concrete expansion shields were used for suspending bus bar feeders from ceilings.

CONNECTING CONCEALED WIRING TO EXPOSED EQUIPMENT

A practical design for flush junction boxes was needed in making connections from concealed conduits to exposed controllers and push-button groups in wiring Cleveland's new Post-Office Terminal. Since many controller locations involved up to five separate runs comprising interlocks to other controllers, various scattered push-button stations, motor run and panelboard home run, standard outlet boxes with blank covers were considered inadequate. The Hatfield Electric Co., Cleveland, therefore developed a uniform junction box design, varied in sizes and knockouts to suit specific locations. Each box was fitted with a two-piece overlapping screw cover. Nipples or angle fittings were connected from concentric knockouts in upper cover section to adjacent controllers or push-button housing hubs. The lower screw cover section was left blank and was made of a size that would provide adequate working space in the box for pulling and splicing. The removable blank cover rendered connections accessible for future maintenance without disturbing nipple connections of upper cover section. A junction box 6 in. wide, 9 in. high and 4 in. deep having 4 in. high upper cover section (plus flush type overlap) and 5 in. high lower blank cover is most suitable on the average for 3 to 5 h.p. 220 volt motors.

Junction Box



Method of Mounting Box

Stock Record System for New and Used Motors

STOCK records for over 2,000 new and used motors of various sizes, speeds, voltages and designs, plus a multitude of control apparatus and instruments demand a carefully planned system. The Briner Electric Company of St. Louis, a pioneer motor sales and service organization with over a half century of experience in this field, have such a system and claim it to be extremely helpful in keeping pace with their expanded field of operations.

Through many years this company has seen many of its diversified list of customers grow into large organizations. Servicing the equipment in these plants involved emergency motor stocks, exchanges, reconditioning, etc., until of late years 40 to 60 employees have been kept busily engaged in their modern 3-story building, with over 25,000 sq. ft. of floor space, this despite the establishment in St. Louis of motor service shops by several leading motor manufacturers.

To render prompt service for the rebuilding of all kinds of motors, this company carries in stock more than one hundred and seventy-five different types of round, flat and special rectangular magnet wire. Another special feature of their service is a complete stock of gears, link and chain drives for motors in certain types of industries which depend upon speedy replacements from their stocks.

Coordinated Record System

To coordinate their repair department with the equipment sales, where over 2,000 new and used motors are kept in stock, it was considered necessary to maintain a system of records which would quickly reveal:

1—The origin of all used equipment carried in stock.
2—Details of reconditioning for resale.
3—History of resale and how equipped.
4—Comparison of used vs. new values.
5—Ready reference data for duplicating breakdowns of prior sales.
6—Compact records covering sales and repairs dating back at least 15 years.

A study of this problem indicated the need for—

A—Numerical shop work order.
B—Numerical customer invoices.
C—New and used stock record book.

Stock Record Book

A new stock record book is made up at the beginning of each calendar year containing a complete detail record of the new and used equipment inventory. Loose-leaf books or file cards are considered too easily misfiled, mislaid or lost, therefore the annual compilation of this record system is deemed justifiable. A leather covered book 5 in. by 8 in., with bound and ruled pages, is tabulated into twelve divisions as follows:

1—D.C. motors
  (a)—115-volt
  (b)—230-volt
  (c)—500-volt
2—A.C. motors—single-phase
3—A.C. motors—3-phase, 60 cycles
4—A.C. motors—3-phase, 25 cycles
5—Motor generator sets
6—Transformers
7—Electric drills and grinders
8—Fans
  (a)—Exhaust fans
  (b)—Ceiling fans
  (c)—Desk fans
9—Oil switches and circuit breakers
10—Instruments
11—Pumps
12—Obsolete and miscellaneous equipment from which to salvage needed parts.

Each divisional class of equipment is arranged on consecutive pages in the order of horsepower or ampere capacity, with each motor size graded by its speed. Left-hand pages of

Stock of special gears, chain drives and sprockets maintained to render quick service.

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stock-book list the used equipment while right-hand pages list new equipment. This method affords at a glance the comparative costs of similar types of new and used stocks.

The durable design and handy size of this record permits its general use in office and salesroom during the entire year. Equipment is ruled out as sold, thus indicating at a glance which items are available for delivery. Records dating back for fifteen years are kept available for ready reference in making service check-ups through this system.

Each motor storage row is numbered in sections depending upon the length of a partial or sectional row for one generally similar type of motor. The section numbers thus determined are marked on floor or at end of display benches, and are similarly posted in stock record book pages which list this group of motors. Thus a specific unit appearing in stock list may be quickly located in stock-room and shown to a customer.

Shop Work Orders and Invoices

Each equipment sale or service job is assigned a shop order number which number appears on invoices to customer. Invoices are also given consecutive numbers, independent of work order numbers. When purchased equipment is placed in stock this shop order number is posted as a part of detail stock record book entry. When equipment is sold the shop order number is also posted in record book at the time of ruling the item from stock list. Thus, when a service call or inquiry comes in which involves equipment purchased from this firm, either the approximate date of purchase, invoice number or work-order number leads to the complete cost records for the particular item in question.

The Inefficiencies of Overmotoring and Undermotoring

By E. C. Dieffenbach
Industrial Engineering Department
General Electric Co., Schenectady, N. Y.

THE most desirable operating condition of any electric motor, as far as heating, power factor (for a.c. motors), efficiency and first cost are concerned, is at rated load and speed. The true load condition of the motor cannot ordinarily be determined by a mere visual inspection. For example, an induction motor may be running merrily along, handling the load and peak loads without apparent effort and yet be so badly underloaded that it is literally pouring lagging reactive kv-a. back into the line to the detriment of the operation of other apparatus on the line.

Power Factor

A low power factor condition is brought about as follows. From no load to full load, the magnetizing current is practically constant and lags behind the voltage by a considerable angle. At no load, therefore, the power factor of the motor is low, since the magnetizing current is the largest current drawn by the motor (no load losses are small and reactance of rotor and stator are low due to low slip). As the load is increased, the energy component in phase with the line voltage becomes larger; combined vectorially with the magnetizing current, the total current drawn by the motor becomes larger and the power factor increases. However, as the load increases, the rotor and stator reactance increase, load and other losses increase until at a certain load, the power factor is maximum and further increases of load decreases the power factor again. Hence, considering power factor alone, it is desirable to operate the motor as near full load as possible and avoid over- and undermotoring.

Efficiency

The efficiency of the electric motor is, in general, highest at full load or just below full load. Hence, in order to avoid poor efficiency the motor should be operated near that point if possible. Load factor has an important bearing on motor efficiency. If the motor is operated intermittently and is lightly loaded but within the range of highest efficiency, the saving in power consumption is less than in the case of a motor operating steadily and properly loaded.

Overmotoring is a direct and avoidable reason for higher first cost. If a motor is applied without due regard to the previously enumerated factors just to provide a "reserve" capacity, the result is overmotoring and higher first cost which applies as well to the control and to the motors share of the distribution system.

Determination of Over- or Under-Motoring

The more obvious indications of undermotoring are heating, blowing of fuses, tripping of the temperature overload relay and in extreme cases, failure to start the load at all.

Assuming that fuse blowing is caused by conditions external to the motor, i. e., conditions other than short circuits, grounds or connections, attention should be directed toward the load. If fuses blow after the motor is up to speed, the load is probably too great for the motor; the remedy is to remove the overload or

Overmotoring

—Overloaded motors operating at excessive temperatures break down insulation;

—Are subject to interruptions through tripping of protective devices;

—Frequently give unsatisfactory starting performance; and create a low plant power factor.

—They also overload the wiring system or require oversize copper beyond the requirements for normal plant power factor values.

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to replace the motor with one of a higher rating. If the fuses blow during the accelerating period, the starting requirements are probably too severe for the motor, perhaps for the type rather than for its horsepower.

Tripping of the temperature overload relay is also an indication of overload and is usually accompanied by noticeable heating of the motor. If the driven machine is free from sticking or binding due to a temporary condition and the motor refuses to start, the remedy is to apply a larger motor or one with a higher starting torque characteristic.

If a single-phase operation is suspected after starting on three-phase power, the ammeter will show the current conditions in all of the lines. An induction motor can run as a single-phase motor but with considerable heating and may give an erroneous impression of undermotoring.

If an inspection of a motor does not give a positive indication of its condition and if over- or undermotoring is suspected, a test should be made. Testing methods include the use of the voltmeter and ammeter with perhaps an estimate of the motor efficiency. Then

$$\text{volts} \times \text{amperes} \times 1.73 \times \text{motor eff.}$$

$$\frac{}{746}$$

is equal to the horsepower. When there is no motor installed, a test motor can be connected and the same procedure followed for determining the horsepower load. An efficiency curve for the test motor should be available if it is to be used for fractional loads.

The dynamometer is a precise device for weighing the torque reaction produced by a driving test motor. The torque is weighed and r.p.m. determined after which horsepower is equal to

$$\frac{2\pi rnw}{33{,}000}$$

where r is the length of the lever arm in feet, n is r.p.m. and w is weight in pounds.

The torque meter measures the torque directly in footpounds.

A shop method of determining the starting torque of a machine is as follows; secure a lever of known length to the driving pulley. A spring scale attached to the end of the lever will give the pounds pull required to start the machine from rest. Continue the test for the running torque. As before, the horsepower to drive a constant torque load will then be

$$\frac{2\pi rnw}{33{,}000}$$

An approximation of the maximum horsepower required to drive a machine may be determined by the pulley diameter, width and speed. Knowing the belt width and speed the horsepower that can be transmitted to the machine can be determined from a curve in an engineering handbook.

The manufacturer of the machine is in a position to give the horsepower and speed of his machine although there is a tendency to recommend too large a motor.

An additional check sometimes can be made by reference to like machines in the same or similar plants. The manufacturer will always recommend a motor for the maximum capacity of his machine whereas it may be applied in such a way that it can never require this maximum size motor.

Here a word of caution should be introduced regarding the characteristics of the load itself. If the torque of the driven machine is practically constant throughout the load range, the general-purpose motor should handle it without difficulty. Examples of such loads are conveyors, printing presses, elevators, clinker grinders, extractors, and refrigerator compressors. If on the other hand, the torque decreases as the speed increases, the constant-horsepower motor should be applied. Examples of constant-horsepower drives are lathes, boring mills, planers, grinders, shapers, gear cutters and radial drills. Another type of load increases as the speed increases. Examples are fans and centrifugal pumps.

Undermotoring

—Underloaded motors represent an excessive first cost in proportion to their productive efficiency;

—Create a low plant power factor, through sending lagging reactive k.v.a. back into the line, to the detriment of the operation of other apparatus.

—"Reserve" capacity is often more expensive than the first extra cost of apparatus.

Hence it can be seen that the load characteristics of the driven machine must be taken into consideration to avoid under- or overmotoring.

Examples

Motors applied to individual machines are often of a larger rating than necessary in the effort to have surplus power available in the event that larger work is handled or a temporary peak occurs. A case in point is a motor of sufficient power to drive a 10-inch lathe which is normally doing 4-inch work; the lathe has ample reserve capacity but the motor runs underloaded the greater part of the time. Such practice provides ample reserve power at the expense of low power factor during normal operation. When you consider the case of the overall plant power factor of a group of induction motors, most of which are overmotored, the result is a low overall plant power factor with accompanying oversize or overheated power supply lines and all related devices.

A single motor driving a group of machines may present another example of overmotoring. The motor is rated to drive the entire group at maximum peak load and under normal operation, only part of the machines are running.

A common cause of overmotoring is to employ a belt which is too narrow or not flexible enough to carry the full load torque of the motor. As a result, the machine is operated at part capacity and the motor is underloaded. A situation of this kind is the result of improper installation. Motors are shipped from the factory with proper pulley width, overhang and bearing area to support the belt width necessary to transmit rated horsepower.

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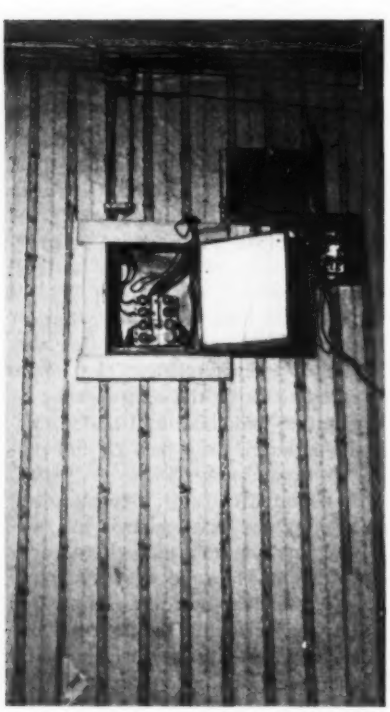
Small City Reinspection Gets Favorable Results

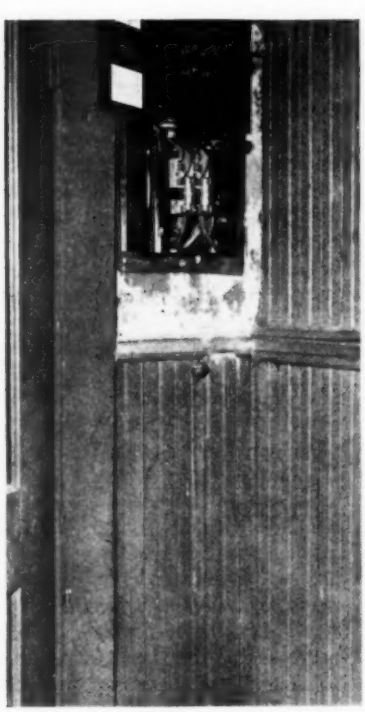
Terre Haute, Indiana, a city of about 65,000 population, maintains an electrical inspection department which has kept pace with the depression's flood of bootleg wiring done by unemployed maintenance men, janitors and the like. To accomplish this, J. A. Mooter, electrical inspector, enlisted the aid and cooperation of industrials and commercial organizations, as well as electrical contractors and wiremen.

While it is not claimed that Terre Haute has no further hazardous wiring to be corrected, evidence is submitted herewith to show the various conditions which were found on reinspection and which are now in the process of correction, under citations from the electrical inspection department.

A further activity promoted in Terre Haute brings the inspector into an advisory capacity with architects and industrials that are planning a wiring system. Thus National Electrical Code compliance is established before bids are taken by architects and before work is installed in plants where a private construction force is employed.

J. A. Mooter





Left—All that's not yet removed from a completely rewired rooming house job. Cord wiring had been extended from old open wiring into various rooms. Middle—New entrance switch and panelboard, from which conduit and armored cable circuits run to various condemned cord-wired outlets. Right—New service and outdoor meter cabinet replacing old overloaded service entrance.

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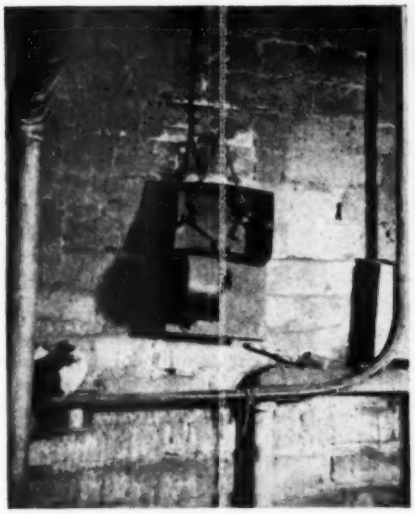
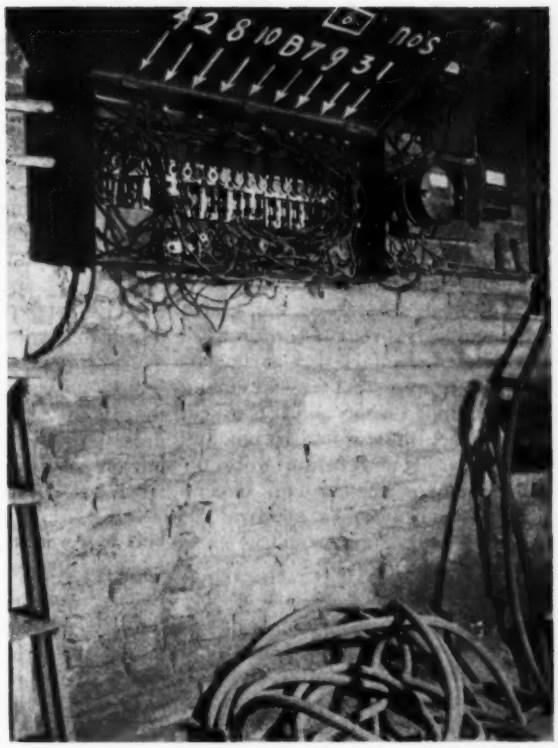
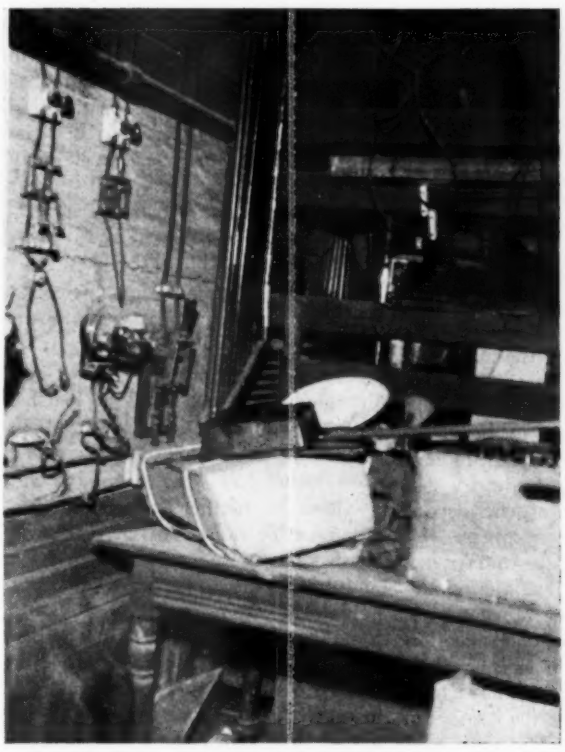


A home made "pendant"' type clock switch in an apartment house basement. Clock and switch cabinet are mounted on ¾-in. slate base, all suspended from twisted telephone wires, carrying 110 volts, tapped from outlet box on wall above. A fiber arm from clock operates home-made switch blade in box. Note one wire pulls against sharp edge of box before turning into terminal post on "switch base."



A kitchenette apartment basement meter cabinet, showing the profusion of tangled wires which so often are the cause of dangerous insulation fires.



Left—Meter room in 24-apartment flat. Wood partition, room filled with trash, a maze of splices to open wires jumpering other wires across room. Right—Opposite end of meter room showing cleated main feeder bus around wall and more taps and splices across walls. Bare joints are common.

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Code Rulings and Explanations

These explanations are made by the Construction Code Authority

Wages on Work Taken Prior to Effective Date of Divisional Codes

A question has been asked as to the application of the provisions of an additional chapter of the Code. The inquiry is prompted with consideration to the fact that particular divisional chapters contain minimum rates for skilled labor, and it is asked whether such rates would be binding on all existing and future work of that division, or whether work undertaken previously to the approval of the additional chapter would be subject to the new rates.

Article I provides in part as follows:

"The provisions of this Code shall apply to the entire industry as hereinafter defined, excluding operations therein undertaken in accordance with bona fide bids made not more than sixty (60) days prior to the effective date, or contracts entered into prior to the effective date; except that the provisions of each chapter incorporated in this Code shall apply only to the division or subdivision of the industry defined in such chapter. In the case of conflict between such chapter provisions and the general provisions of this Code, the chapter provisions shall govern."

Article II, Section 10 defines "this Code" as follows:

"The term 'this Code' as used herein shall mean and include, unless the context clearly indicates otherwise, all chapters from time to time included herein, together with any modifications or amendments thereto."

Accordingly, there are excluded from the operations of any chapter of the Code operations therein undertaken in accordance with bona fide bids made not more than sixty days prior to the effective date of the chapter and contracts entered into prior to the effective date of the chapter. In the case of Chapter I the effective date was March 2. In the case of an additional chapter, the effective date is as defined in that chapter. Between March 2 and the effective date of an additional chapter the members of the particular division of the industry are bound only by the provisions of Chapter I and contracts entered into during this period or operations undertaken after the effective date in accordance with bona fide bids made not more than sixty days prior to the effective date of such approved chapter, but not prior to March 2, are not bound by the provisions of the particular chapter but only by the provisions of Chapter I.

Bids to Awarding Authority After Rejection of General Contractor Bids

The question has been asked whether a special or sub-contractor may agree with the awarding authority to perform the work required in a particular branch of the industry at a price lower than the special contractor had bid to a general contractor for this same work. It is explained that initially the awarding authority had requested bids from general contractors, and special contractors had submitted bids to the general contractors for performing their portion of the work. Subsequently, the awarding authority decided to reject all general contract bids and forthwith proceeded to negotiate with special contractors for performing their portions of the job under direct contract. A similar situation had arisen in another case where the portion of the work to be performed by a particular group of special contractors had been eliminated by the awarding authority from the contract given to the general contractor. Granting that the special contractors in these instances are now at liberty to quote a price to the awarding authority less than that quoted to the general contractor, the opinion is expressed by the party requesting the interpretation that here is a possible opportunity for defeating the fair competitive practices of the Construction Code with consequent chiseling by awarding authority and contractors.

It is apparent that if the owner rejects the general contractor's proposals in whole or in part the sub-bids made to the general contractor for such work are automatically rejected. The owner is then free to secure prices for the work which he will directly undertake subject to the restrictions thereon imposed by the Code. Section 10 of Article VII states that bids may not again be invited or submitted for the mere purpose of obtaining a lower or revised price for substantially the same work previous to the elapse of ninety days from the date of such rejection except under certain modifying conditions enumerated in Section 10. Furthermore, several divisional chapters restrict the members of their respective divisions with regard to changing prices bid except for variations in wages or material prices or substantial changes in original plans and specifications.

Withdrawal of Bids

A special or sub-contractor having made his bids to the general contractor and filed duplicate copies with the designated bid depository discovers that he has made an error in his price. He inquires whether he has the right to withdraw his original bid from the general contractor and the bid depository, or whether he may revise his bid to correct this error prior to the time when the general contractors bids are to be received by the awarding authority.

The Code does not alter any existing legal right with respect to the withdrawal of bids.

Under the provisions of the Code, the bidder may not revise his bid after the time set for its receipt, as this would be a violation of Section 7 of Article VII.

There is further protection provided in Section 9 of Article VII against the use of a bid which is so unduly low as to indicate an error or mistake in estimating, providing that the awarding authority "shall not use any bid which is so unduly low as to indicate an error or mistake in estimating without first giving the bidder the opportunity of demonstrating by cost sheets or other methods the correctness of the bid that he has submitted".

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Brush Selection

Brushes are designed for a wide variety of uses and each type should only be used in the particular application for which it is designed. Real brush trouble can be usually traced to wrong application

By B. F. Wallace
Electrical Engineer
Becker Brothers Electrical Corp.
Chicago, Ill.

WHAT constitutes a good brush? That question is hard to answer without knowing something of the operating conditions under which that brush will have to operate. As a matter of fact all brush grades are good grades. They have to be in order to survive competition.

With four raw materials, coke, graphite, lampblack and hydrocarbon binder, nearly every brush manufacturer makes some thirty or forty grades of brushes. These several grades can be classified under five general groups—

1. Carbon brushes
2. Graphite brushes
3. Carbon-Graphite brushes
4. Electro-Graphite brushes
5. Special grades

The carbon grades are usually coke flour mixed with sufficient binder to mould or extrude into the shapes desired. They are then baked to a temperature high enough to insure complete carbonization of the binder.

The graphite grades are made in the same manner except that flake, amorphous or artificial graphite is used instead of coke flour.

The carbon-graphite grades are mixtures of coke and graphite with a suitable binder. The proportions depend upon the results desired.

The electro graphitic grades are made in the same way using coke and lampblack. However, in addition to the regular baking process they receive an additional heat treatment in the electric furnace. This additional heat treatment graphitizes the carbonized binder and the coke. The lampblack remains unchanged.

Every brush manufacturer has a number of special grades the method of manufacture known only to himself. These grades include brushes especially designed for motors having troublesome high mica, also brushes with unusually high contact resistance and brushes with high cross sectional resistance.

The attachment of the leader wire or pigtail is something of a problem but is accomplished in the three familiar forms: Screw Plug, Cement, Rivet.

The screw plug leader wire is used advantageously by the maintenance man in making repairs. The cement leader wire is usually put on by the manufacturer and is entirely satisfactory for the ordinary run of motors and generator brushes. Where severe operating conditions are encountered the riveted leader wire is best.

The primary purpose of a brush is to convey the current from the outside circuit to the revolving commutator and vice versa. However, there is a secondary purpose that is equally as important and that purpose is commutation.

Whenever an armature coil is short circuited by a brush the current in that coil must be reduced to zero in the fraction of a second that the coil is under commutation. In order to do that either resistance must be inserted into the circuit or an e.m.f. set up in the opposite direction. If this current is not reduced to zero a circuit is broken when the coil leaves the brush and a spark results.

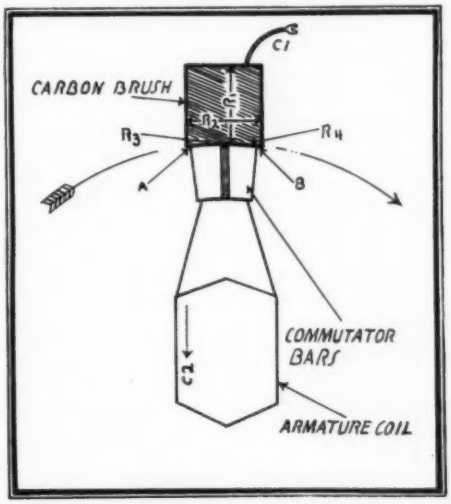

Diagram illustrating the physical and electrical characteristics of a brush affecting commutation.

Since this short circuited current must pass through the brush the characteristics of that brush is an important factor in reducing the current to zero.

These characteristics are classified as physical and electrical.

1. Physical
   a. Hardness
   b. Density
   c. Strength
2. Electrical
   1. Specific resistance
      a. Longitudinal resistance R1
      b. Cross sectional resistance R2
   2. Contact resistance
      a. Toe resistance R3
      b. Heel resistance R4

It is quite evident that the physical characteristics while important have little or nothing to do

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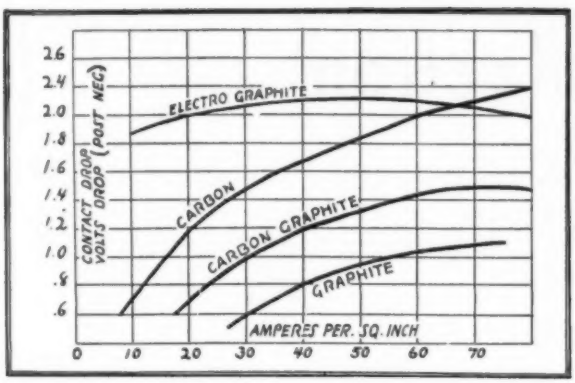

Curves showing the comparative contact resistances of various brush types.

with commutation. These characteristics affecting commutation are illustrated in the accompanying diagram. This represents a coil moving in the direction shown being short circuited by a brush. Now at the exact time of short circuit the coil is in the mid-position between the poles. Were it not for stray fields, armature reaction coil induction or inertia there would be no current in the coil. However, this current has a very definite though momentary value. It is represented by C2 in the sketch. It differs from the current C1 to the outside circuit and may exceed it in value.

Since the current C2 passes through only the face of the brush the specific resistance R1 will affect that current but little. However, the specific resistances R2 and the contact resistances R3 and R4 will materially affect it.

When the coil first touches the toe of the brush "b," a high resistance R3 would be advantageous but when the coil leaves the heel of the brush "a" the coil is entering a field of opposite polarity so that an e.m.f. is being induced in the coil in the opposite direction to C2. As this e.m.f. would help to reduce the current, there should be as little opposition to its flow as possible, hence, R4 should be low. If too low, however, this counter e.m.f. would build up too rapidly so that a current opposite in direction to C2 would be interrupted when the coil leaves the brush. This would also result in sparking or arcing.

The resistance R2 should be high but any value greater than R1 would only force the current C2 up through one side of the brush to the leader wire and down the other side.

BRUSH APPLICATION

Type Motor	Type Commutator	Recommended Grade of Hardness		
		High Speed	Low Speed	Machines with Troublesome High Mica, Any Speeds
Fractional Hp d. c. motors: with voltages higher than 100 v.	Flush mica	CG40	CG50	CG60
	Undercut mica	CG40	CG45	
Fractional Hp d. c. motors with voltages lower than 100 v.	Flush mica	CG25	CG35	Special CG50 Artificially lubricated
	Undercut mica	CG30	CG40	
Industrial d. c. motors of less than 10 Hp	Flush mica	CG50	CG35	
	Undercut mica	CG40	CG50	
Industrial d. c. motors and gen. greater than 10 Hp	Flush mica	EG45	EG50	Special EG70 Abrasive
	Undercut mica	EG50	EG45	
Universal motors; vacuum cleaners; drill motors, etc.	Flush mica	EG70	CG50	Special EG70 Abrasive
	Undercut mica	EG50	EG60	

BRUSH CHARACTERISTICS

Group	Contact Resistance	Grade Hardness	Specific Resistance Per Inch Cube
Carbon	High	CG 60	0022
		CG 50	0020
Carbon-graphite	Medium	CG 40	0016
		CG 40	0018
Graphite	Low	CG 35	0014
		CG 30	0012
		CG 25	0006
Electro-graphite	Very high	EG 70	0020
	High	EG 65	0014
	Medium	EG 50	0010

The specific resistance of a brush as represented by R1 and R2 has a definite ohmic value depending upon the grade of material. It is constant for that grade although it varies somewhat with temperature.

The contact represented by R3 and R4 does not follow ohms law and its value depends as much upon the type of machine, the temperature of the brush and commutator surfaces, the humidity of the atmosphere, the amount of oil on the commutator, the per cent and quality of the mica and many other factors as much as it does upon the brush grade. This variation of operating conditions explains why a brush grade will often work successfully on one machine but fail on a similar machine where operating conditions are different.

Because a high contact resistance in a brush is desirable it does not hold that a high contact resistance brush is always desirable. While no definite rule can be laid down for brush selection usually the higher the line voltage the higher the brush contact resistance for good commutation. Even on high voltage machines discretion must be used because a high contact resistance represents a definite electrical loss. This loss is the product of the resistance and the square of the line current. Where the current is large this loss is considerable and is liberated in the form of heat. On low voltage machines the resulting heating of brushes and commutator may be very serious.

A comparison of high grades is shown in the table of brush characteristics. As every carbon manufacturer makes several grades of each of these five groups a few of these grades together with their characteristics is shown in the table. The letters indicate grade group and the numbers indicate the comparative hardness.

The curves showing comparative contact resistance gives comparisons made under laboratory conditions. These values show the comparative contact resistance but not the values under all conditions of service.

The special grades have too widely varying characteristics to list. Since no definite value can be assigned to the contact resistance it is listed for matter of comparison.

Money for Building Repairs and Remodeling

DURING the past four years there have been a number of programs for building renovization, telling the public why it should remodel, repair-now, etc., but all lacking in one essential—telling the public how and where it could get the money to pay for the work

To overcome this major difficulty Congress passed and the President on June 27 signed the National Housing Act. Under this Act a Federal Housing Administration was created. It is headed not by a braintruster but by a world famed business man, James A. Moffett, 48-year-old senior vice-president of the Standard Oil Company of New Jersey.

The National Housing Act places the government behind loans for remodeling buildings and for erecting new homes by means of loan and mortgage insurance. Remodeling loans, which may be for any amount from $100 to $2,000, will upon proper credit information be granted by financial institutions cooperating with the housing administration and the government will insure all loss upon such loans up to 20 per cent of the amount so loaned by any institution. For new residences the government will insure mortgages for not to exceed 80 per cent of the value of land and building.

The Federal Housing Administration is now being organized into district and local committees. The first activity has been to secure the cooperation of banks, trust companies and other building loaning institutions. As soon as this phase of the work is well under way the publicity forces of the administration will start to sell the property owning public upon the advantages of making necessary repairs now. It is the plan of the administration to sell the idea upon entirely selfish motives and not upon any patriotic or philanthropic plea.

For the time being the Federal Housing Activity will be devoted entirely to remodeling. Those in the administration state that it will be from three to six months before the new house building program can be tackled in earnest.

Appliances

The money for remodeling must be spent for equipment and materials that will be a permanent part of the structure. Thus refreigerators and electric ranges are classed as portable and cannot be financed under the Act. However, it is stated that built-in equipment can be so financed and it is, therefore, assumed that the elements of an electric kitchen, when permanently built-in, can be included in the cost.

Money for remodeling is not confined to residences but will be forthcoming for remodeling and repair work in stores, office buildings, factories, apartment buildings and farms. In other words, it includes the class of work which has been almost the electrical contractor's entire volume for the past two years.

Coming at the start of the 1934 Better Light—Better Sight drive it can be used by electrical contractors as a means for securing a larger volume of work in revamping the lighting of stores, factories and offices as well as aiding in the sale of house refixturing.

Contractors May Apply

Either an owner or a contractor may apply for the loan. If the latter, he must secure an acceptable credit statement from the owner (forms for these are available at the banks or the local committee) and a note which, if in order, will be purchased by the bank from the contractor, at full value less a discount for interest and fees at not to exceed $5.00 for each $100 face value of the note. The contractor, therefore, should secure from the owner a note sufficient, not only to cover his work but the discount or financing charge as well.

After the bank has purchased the note the contractor is relieved from all future responsibility, other than his guarantee of the work.

In other words, this plan while it involves partial payments by the borrower or customer differs from commercial partial payment plans that the contractor has been accustomed to handling in that (1) the contractor receives the entire amount of his bill upon the completion of the work, (2) the contractor assumes no credit responsibility for his customer in case of default upon the note.

The Federal Housing Administration has prepared a number of booklets outlining the workings of the Act and has now in preparation one for contractors and sub-contractors. This, which should be released very soon, will be available at the local committee.

Cooperative Effort

Because builders, masons, plumbers, heating contractors, painters and others will be eager to secure the advantages of this activity it behooves the electrical industry to set up some sort of cooperative effort through a league or otherwise to make sure that the public is sold the advantages of rewiring for improved adequacy, refixturing and relighting, replacement of obsolete equipment and wiring and replacement of defective wiring. In places where no league exists the power company should be made to see the advantages of promoting ways in which the public could use this money to revamp their electrical service.

It offers the industry the opportunity for financing (1) adequate wiring in old homes and other buildings, (2) reinspection corrections, (3) Better Light-Better Sight campaigns, (4) electric kitchens in old homes, (5) overhauling of the wiring in small factories, (6) replacement of cord wiring and obsolete inadequate service in apartment buildings, (7) modern lighting for stores and office buildings, and (8) home refixturing.

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electrical contracting

With which is consolidated Electrical Record

S. B. WILLIAMS, Editor

CODE EVASION

IF it were not serious it would be amusing to watch the various ways in which general contractors try to get around the Code and continue the practice of bid peddling and chiseling. From virtually every section of the country there come reports from electrical contractors of such evasion. Of course, as each evasion is ferreted out and a rule applied a new dodge is thought up until it becomes almost a contest.

Nevertheless, it is apparent that the construction code is working and that the bidding practices are decidedly improved. While there will be people who will try to get away with discreditable practices, it will be found that the rank and file are honest and want to see conditions improved.

FINANCING LOCAL CODE COSTS

THE budget for financing the electrical contractors' code administration allows one-tenth of one per cent on contracts of $250 and over for the local administration. Obviously, this is not enough to cover the necessary expenses of a local office. Under normal times it would undoubtedly have produced sufficient income but with today's building market it is insufficient.

Inasmuch, however, as this is at present virtually the only cooperative local activity in the contracting industry why shouldn't the local association continue to finance the local administration?

The Code is not intended to replace association effort although it would appear as though some seemed to feel that way. Dues to the local association should continue to be paid and the association work continued.

In fact, if the local association is allowed to fall into disuse because of the Code, the local contractors will find that they have lost something worthwhile. The local code administration committee cannot confer with wholesalers or utilities on trade practices; it cannot engage in an activity to secure a new ordinance. In fact, there are a great many things of both a business and a social nature that only an association can do.

If the local association will handle the local administration and its cost it should be found that the association is in a stronger position than ever. Theoretically, of course, the code work should pay for itself but when it will not, isn't it best for the association to carry it along and secure the benefits for the community instead of letting the thing drift? Of course the benefits will accrue to all of the local contractors, whether members of the association or not, but what of it? Where would the industry have been if the N.E.C.A. had taken the attitude that it would not finance the code work because so many contractors were not members?

HOW TO FINANCE REINSPECTION

FROM time to time we have included within our pages photographs of actual conditions found on reinspection. These defective wiring conditions exist in every city in the country.

Lack of money and inability to borrow has been claimed as a great drawback to the active enforcement of reinspection. Under the provisions of the National Housing Act a property owner may secure from the banks the necessary funds for the correction of defective wiring provided the cost does not exceed $2,000.

This is an opportunity to enlist the support of the local Housing Program Committee, the inspection authorities, banks, etc. Tied-in with Fire Prevention Week in October it should receive a very favorable public response.

LIGHTING SCHOOLS

THE second year of the Better Light—Better Sight program starts this fall with an effort to obtain greater participation by the entire industry. Last lighting season the activities of the sponsors were devoted almost entirely to securing the support and participation of the public utilities. The results of the campaign were of such a nature as to impress upon the promoters the necessity of

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tying in the retailers, fixture dealers and contractors.

To bring these other branches into active participation lighting schools will be conducted in a large number of localities. In the past there have been schools, but never any concerted simultaneous drive as is contemplated this year.

These schools can be very productive of results provided the sponsors do not expect too much of them. Strangely enough every contractor will not be attracted by a school, and furthermore those who do enroll may find other things, such as a job to figure, come up on school nights.

Nevertheless, it will be found that at least a quarter of those who enroll will finish the course. If a canvass of these men were to be made six weeks later it would be found that they had sold lighting jobs as a direct result. Is that not worthwhile?

Those who expect too much are bound to be disappointed but those who look for only a reasonable attendance and attention are bound to be pleased with the results.

CODE ADMINISTRATION PROGRESS

IT has been four months since the electrical contractors' code became effective. In that time the Code Authority and its headquarters office have been extremely busy in the most tiresome and seemingly the least results productive activity of all—organization.

The country was divided into twelve regions with a director in charge of each. These directors had each to organize his regional committee, the members of which organized district committees and finally through the latter, came the local administrative committees. Next bid depositories had to be set up.

During this organization work which of necessity had to take time because the work was all new, both to the national directing office as well as to the local people, the budget remained unapproved for weeks. This automatically prevented the Code Authority from making an assessment with the result that the progress of the work was again slowed up. The N.E.C.A. advanced money as needed but as this money had to be paid back to the association, it was not deemed wise to anticipate the budget beyond the merest essentials. Accordingly, the progress has of necessity been slow but even so none of the vital essentials has been held back.

The headquarters' staff, small in number, has had to set up record and filing systems, develop forms, handle masses of inquiries, compile lists, disseminate information and finally work out a plan for collecting the assessments.

All of this is recited because there is a little uneasiness on the part of some contractors as to when the Code will function. In many places the Code is already working and compliance being secured. In other places, it has taken longer to organize.

Now, that much of the organization work has been completed it is possible to take the next step—securing compliance by legal action. A number of test cases of national importance are pending and it is the intention of the Code Authority to see that each one is prosecuted in accordance with terms of the Act.

The industry can have full confidence in its Code Authority to administer the Code to the best possible advantage to the industry. Its policy, however, has been and probably will continue to be to proceed slowly and carefully on the theory that the fewer mistakes that are made the greater the progress in the long run.

INSPECTORS' MEETINGS

IN the next two months most of the divisions of the International Association of Electrical Inspectors will hold their annual meetings. These meetings this year are probably of greater importance than any previous ones for two reasons. First, the various meetings will hear the presentation by a member of the Edison Electric Institute of the power companies' version of what the National Electrical Code should be. Secondly, the various meetings will hear about the Electrical Contractors Code, how it is working and how the inspectors can cooperate.

Every inspector ought to attend his divisional meeting, but unfortunately many cannot because of the cost. It will be of advantage to the contracting industry to have their inspectors attend these meetings and receive the above information first-hand. For that reason we suggest that the contractors in each community make an effort to secure from the city a traveling allowance so that their inspector may attend his divisional meeting.

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\\\ code chats ///

A MONTHLY DISCUSSION OF WIRING PRACTICE AND QUESTIONS OF INTERPRETATION, PRESENTED WITH A VIEW TOWARD ENCOURAGING A BETTER UNDERSTANDING OF THE NATIONAL ELECTRICAL CODE

CONDUCTED BY F. N. M. SQUIRES
CHIEF INSPECTOR, N. Y. BOARD OF FIRE UNDERWRITERS

STAPLES FOR SHEATHED CABLE

Is the so-called flat B X staple an approved fastening for non-metallic cable as called for in Article 50, Paragraph D-2?

The question of approval of the staples referred to by our inquirer rests with the manner in which they are used rather than with the device itself.

If used in such a manner as not to injure either the armored cable or the non-metallic sheathed cable, there seems to be no objection to them, and inspectors quite generally are approving of their use.

However, a few extra blows with a hammer will damage either type of cable to such an extent as to make further use of the cable objectionable and, therefore, as said above, their approval rests with the manner in which they are installed by the mechanic.

PECULIAR SPECIFICATIONS

I have been asked to estimate on the following specification:

From power panel to boiler room, run one line of 3-in. conduit and two No. 400,000 C.M. cables, and 2-250,000 C.M. cables, this conduit to run through the dye house and up through the second floor of the Madison Avenue mill; conduit to run to a 400-amp. 3-pole fused switch located about center of north wall, and continued to third floor, terminating in a 400-amp. 3-pole switch. At this point, furnish and install one 60 K.V.A. phase changing transformer from 2-phase to 3-phase, near phase changing transformer, install one 3-pole 200-amp. no voltage release circuit breaker. On this floor there will be 48 loom motors, 2 quill winders, 6 winders, 2 warping frames, one extractor, and one motor generator set for loom stop motion. All conduit to be installed on ceiling and run down to switch boxes.

Am I correct in concluding that according to the size of wire specified, the two 400-amp. switches to be used are out of proportion, and accordingly, such an installation would not pass inspection.

The specification does not mention what sort of a system supplies this installation but the requirements for the transformers indicate, quite clearly, 2-phase. The switches, however, indicate the system to be 3-wire but there is nothing to indicate what the extra cable is for.

We will assume, therefore, that the system is 3-wire 2-phase and that the feeders are two 250,000 C.M. with one 400,000 C.M. conductor for the common wire. The other 400,000 C.M. cable is a spare.

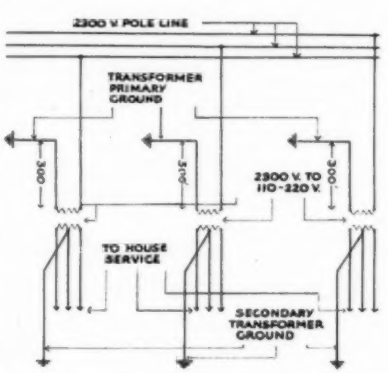
Over current protection should be provided on the power panel in the boiler room and this should not exceed 250 amp. for the 250,000 C.M. wires and 325 amp. for the 400,000 C.M. wire. Fuses of this size would require 400-amp. cutout bases.

It would not seem that 400-amp. fused switches would be necessary at the second and third floors as both floors could not take off the full capacity of the feeder. Assuming that half the capacity would be used on each floor, then 200-amp. fused switches would be large enough.

One thing to be avoided if possible, is the running of the conduit through the dye house. The corrosive fumes given off from some dye stuff soon eats away the metal conduits.

EARTH RETURN FOR 2300-VOLT LINE

Below is a sketch of a 2300-volt pole line.



A tap is taken off one leg and run to a 2300-volt 110-220 transformer. The other side of the primary is run back about 300 ft., stapled to a pole into ground. The secondary of the transformer is also grounded at transformer pole. This primary ground is protected about 6 ft. within the wood stripping.

I do not think that this is a very good practice and not practical, since if the two said grounds are partial grounds, there will be a leak causing 2300 to flow back into the secondary side. Also, if the ground on the primary side happens to break, and someone happens to touch it, they will get 2300 volts.

What is your opinion?

It does not seem that such a scheme would be efficiently practicable. Driven grounds are indicated and these are seldom all that can be desired.

It is indeed probable that the losses incurred through poor conductivity

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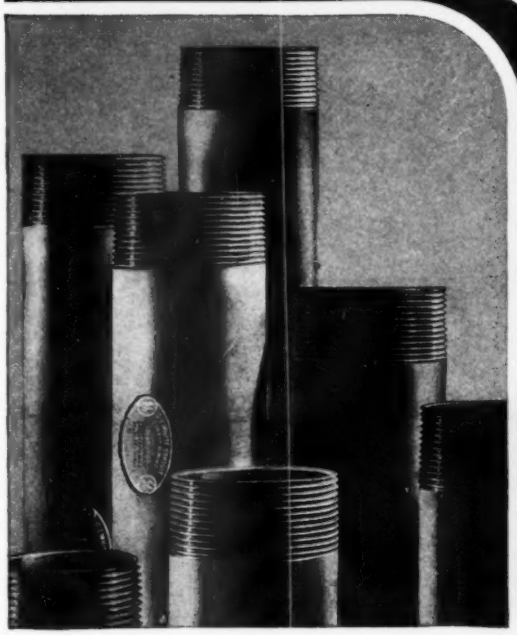

FIBERDUCT
FOR UNDER-FLOOR
WIRING

G-E Fiberduct assures adequate outlets when and where you want them. Easy to install. Used for lights, power, signals, telephones. Outlets may be tapped into the system at any time . . . anywhere. A permanent, flexible wiring system that will meet all future changes economically.

G-E WHITE
EXPLOSION-PROOF
CONDUIT

Extra-heavy, machine-wiped zinc layer covers finest mild steel inside and outside — no rough zinc at ends. Smooth, non-chipping Glyptal lacquer protects against all corrosion. G-E White bends, cuts, threads easily — wires slide through it freely. Economically installed — outlasts the building.

Samples and information on these products may be obtained from your nearest G-E Merchandise Distributor or by writing Section CCF-199, Merchandise Department, General Electric Co., Bridgeport, Conn.

GENERAL ELECTRIC

WIRING MATERIALS

MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT

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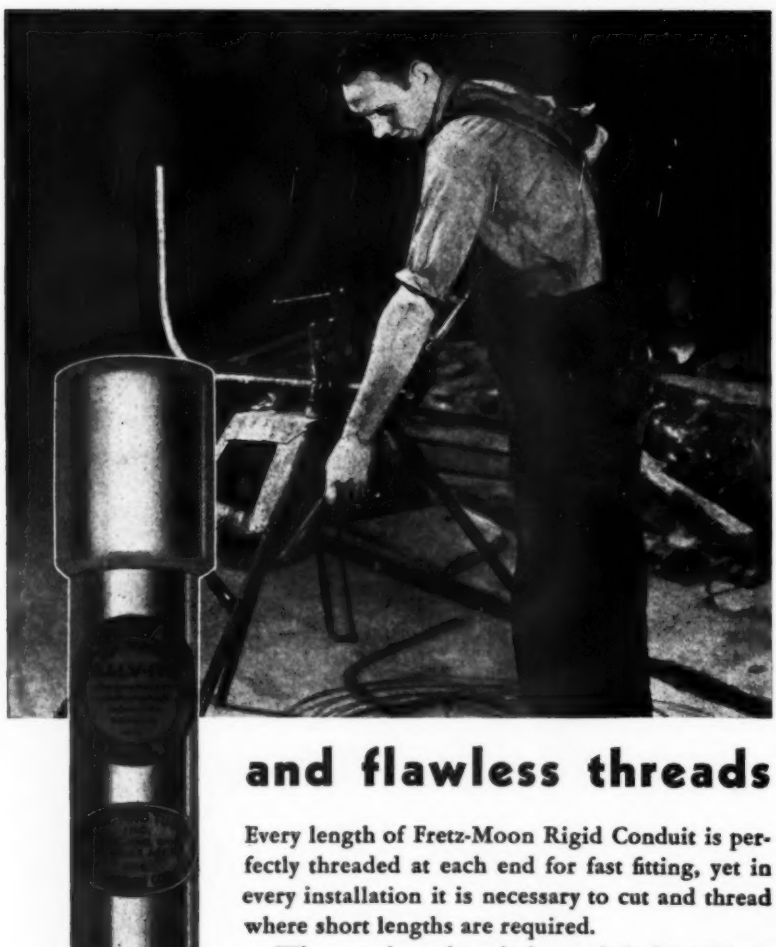
free, easy cutting



and flawless threads

Every length of Fretz-Moon Rigid Conduit is perfectly threaded at each end for fast fitting, yet in every installation it is necessary to cut and thread where short lengths are required.

When a short length is needed, Fretz-Moon Conduit may be cut and threaded with remarkable ease. The steel of which it is made is a special grade that affords high strength to meet the requirements of all types of installation, and uniform structure that threads like soft metal. The threading die runs smooth and true, cutting sharp, clean, accurate threads every time—for the free-cutting quality of Fretz-Moon Conduit is uniform throughout every length. And because it is exclusively made by the scientifically-controlled "continuous process," it is absolutely free from hard or "burnt" spots that might cause threading trouble. A single trial of Fretz-Moon Conduit usually convinces. Contractors who are looking for a better electrical conduit should write for further information.

STEEL AND TUBES, INC.
CLEVELAND • • • OHIO
EXCLUSIVE SALES AGENTS

FRETZ-MOON
***RIGID* CONDUIT**

of the paths to earth would soon amount to more than the cost of running a metallic return or neutral wire.

Also some of the hazards mentioned by the inquirer are present and would be quite objectionable. There seems, however, to be no reason for believing that if two of the grounds are partial that there would be a leak of 2300 volts into the secondaries.

The Code, however, does not touch upon this subject, probably because it was never considered that such connections would ever be attempted.

GROUNDING IN OUT BUILDINGS

Our inspection department requires that in the case of an outhouse, garage, or sign, flood light on steel pole, it is necessary under 904-e when running from the main building, where there is a water pipe ground to not use any open wiring between the buildings, unless bonded to a water pipe conduit in outhouse, sign or flood light on steel pole. We have been required to run a steel messenger wire, and use BXL cable attached to same, or carry the line underground, as there is only in rare cases a water line near. On short runs where the distance is only 10 or 12 ft. we join the conduits continuously, but have lost considerable business, particularly in regard to the sale

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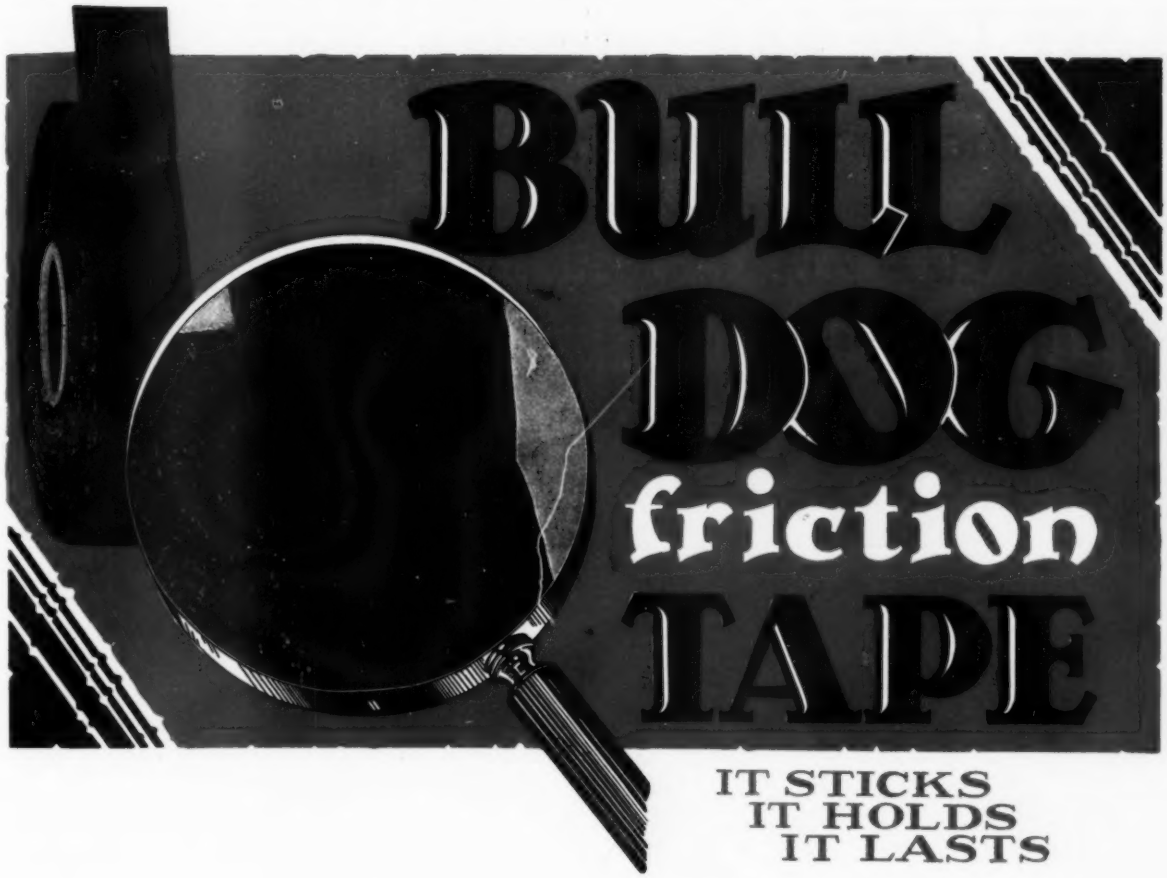
INSPECTION SERVICE KEPT UP IN ST. LOUIS: Despite the drastic reductions in many cities, St. Louis, Mo., has been fortunate in keeping fourteen persons in its electrical inspection department. Eight of them are deputy inspectors who are kept outside. While no definite reinspection campaign is being conducted in St. Louis, P. A. Dates, chief inspector (seated), states that unauthorized or defective work is being reported and cited regularly by the seasoned field force, due to their length of service in definite districts. The St. Louis courts, it is claimed, have cooperated with the department satisfactorily in prosecuting violations of the licensing ordinances. Owners are allowed 10 days for correcting hazardous wiring, after which time the director of public utilities is authorized to order complete service disconnections.



BULL DOG TAPE HAS "TEETH"

And it "shows them" as you separate surfaces which have adhered. Not to display an ugly disposition but to denote its tenacity of purpose

—to stick,
hold
and last!

BOSTON WOVEN HOSE AND RUBBER COMPANY
CAMBRIDGE, MASS.

SAVE TIME AND TROUBLE

in concrete construction—

NEW APPLETON COMBINATION CONDUIT ANCHOR OUTLET BOX FIXTURE SUPPORT UNIT and BUSHLOCK . . .

(Licensed under U. S. Pat. Nos. 1,740,725, 1,828,876. Other Patents Pending)

No. 7060 Appleton Conduit Anchor Fixture Support Unit

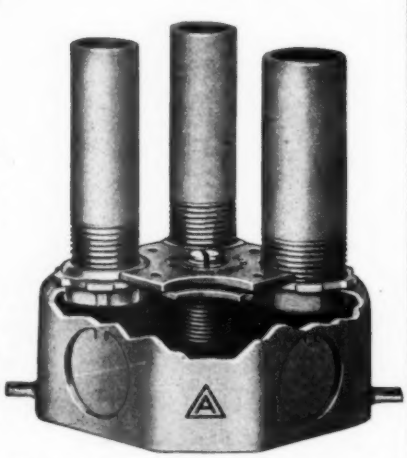
No. 7065 Bushlock ½" x ¾" size

No. 7066 Bushlock ¾" size

Here is a new opportunity to cut costs. With this new Appleton Conduit Anchor Fixture Support Unit, having ¾" knockouts, together with either ¾" or ½" x ¾" bushlocks, it is now possible to order one size for all combinations.

The complete unit is nailed to the form; the Bushlocks are attached to the conduit ends, and the conduits are inserted into the knockouts; the Anchor is turned down over the Bushlocks, securely anchoring the conduits, the outlet is bushed, an unlimited fixture support is obtained, and a positive and permanent conduit ground provided.

Labor costs are saved, such as rechecking of marks made by the layout man; time of man holding reinforcing rods and conduits while another man reaches underneath to attach the bushings, replacing of conduits knocked out of position, time required in watching conduits and outlets while the concrete is being poured.



No. 7060 Unit, Nos. 7065 and 7066 Bushlocks showing method of application

Write for complete information

Sold through Jobbers

Appleton Electric Co.
1704 Wellington Ave., Chicago, U.S.A.

New York.....150 Varick St.
Los Angeles.....340 Azusa St.
San Francisco.....655 Minna St.
St. Louis.....420 Frisco Bldg.
Detroit.....7724 Woodward Ave.
Philadelphia.....530 Arch St.

Appleton Electric Company (C.A.F.S.—934)
1704 Wellington Avenue
Chicago, Illinois

Please send me information on new Appleton Combination Unit.

Name .....

Address .....

City..... State.....

EFFECT OF 440-VOLT GROUND: A 440-volt power service grounded and arched through 1½ in. conduit before blowing primary fuses during a $62,000 fire of undetermined origin in the Garfield School, Terre Haute, Ind. One side of the 1½ in. bushing also burned off inside of entrance switch. This photograph was taken after service equipment was removed, with entrance conduit left in place.

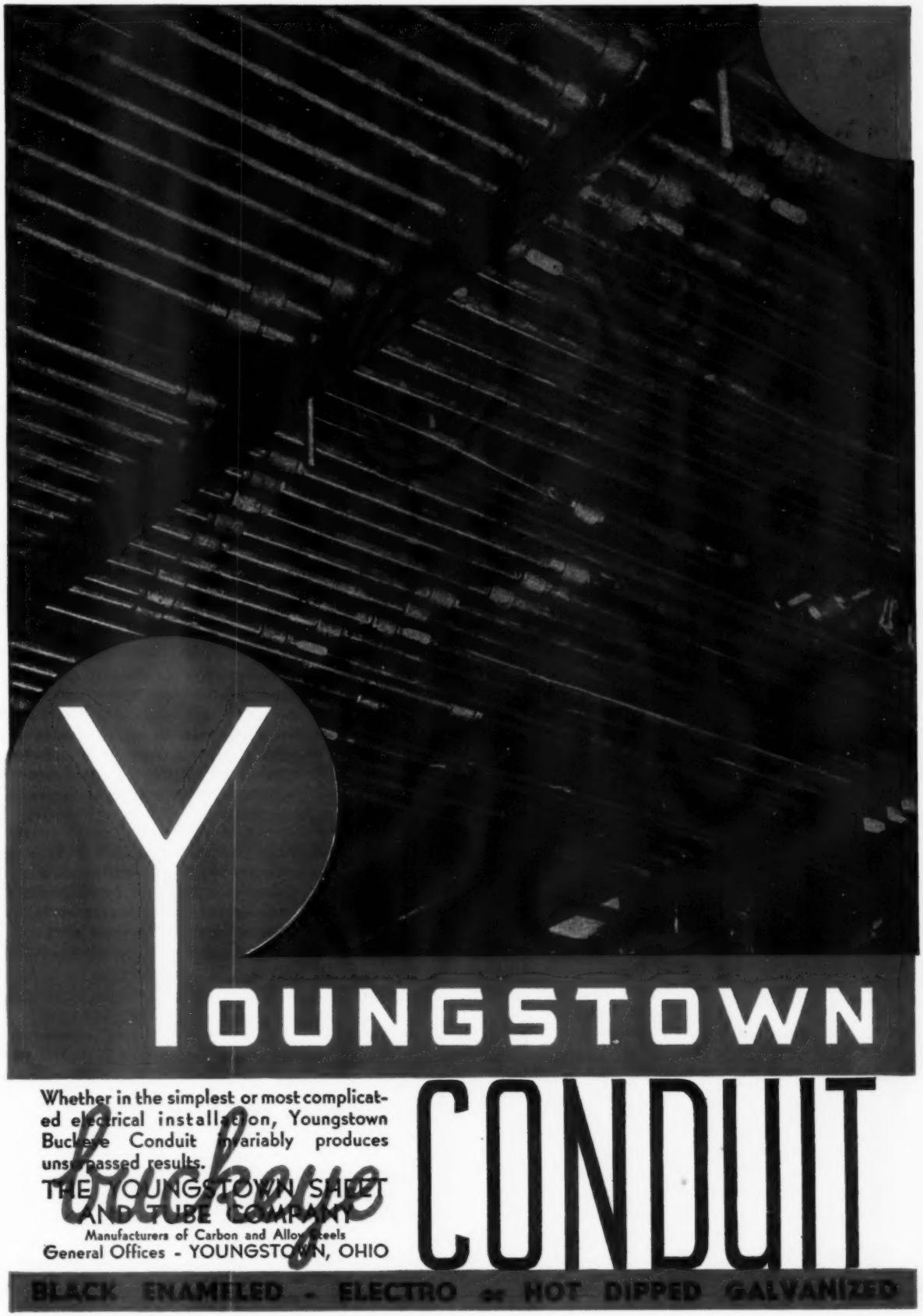
of flood lights around stands and small filling stations.

Our contention is that the Code does not intend to prohibit open wiring between buildings, and that conduit and armored cable is not intended to be strung in the air, and that a driven electrode can be used, or a No. 14 ground wire strung overhead with copper type ground clamps attached to the building and outhouse conduits, and that the steel pole holding a flood light or sign, would have such a ground that there would be no danger of a shock.

There is no intent in the Code to prohibit the use of open wiring between buildings nor for out-of-doors wiring. If it had, such a prohibition would have been mentioned both in Article 3 and in Section 501.

Section 904-e says that isolated sections of conduit, etc., should *preferably* be grounded by connection to grounded conduit or, when this is impracticable, by the use of separate grounding connections. This would permit the grounding of the isolated conduit, such as would be in an outhouse, by means of a separate grounding conductor which could be run as open wiring and as permitted by 908-1 (3) or by means of driven electrodes.

If the grounding conductor were used, the size would be determined by 908-k. If artificial grounding were used 907-d would have to be observed.


YOUNGSTOWN
CONDUIT
Whether in the simplest or most complicated electrical installation, Youngstown Buckeye Conduit invariably produces unsurpassed results.
THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices - YOUNGSTOWN, OHIO
BLACK ENAMELED - ELECTRO or HOT DIPPED GALVANIZED

CODE AUTHORITY NEWS

Material for this Department is furnished by The Electrical Contractors' Code Authority headquarters staff.

L. E. Mayer, Chairman, 569 W. Van Buren St., Chicago, Ill.

L. W. Davis, Executive Officer, 420 Lexington Ave., New York, N. Y.

E. N. Peak, Vice-Chairman, Marshalltown, Iowa

J. G. Livingston, New York, N. Y.

W. A. Ritt, Minneapolis, Minn.

A. J. Hixon Boston, Mass.

W. W. Ingalls, Miami, Fla.

R. W. Hodge, Kansas City, Mo.

D. B. Clayton, Birmingham, Ala.

Lloyd Flatland, San Francisco, Cal.

R. L. Jacobe, Houston, Texas

230 L. A. Cs.

The number of local administrative committees now operating under the jurisdiction of the Code Authority has reached a total of 230 committees, which constitutes an increase of approximately 70 committees for the month of August.

One hundred and seventy-five Bid Depositories have been established throughout the country, an increase of 65 for the month of August.

LABOR POSTERS

Official copies of the labor provisions of the Electrical Contracting Code have been received by the Code Authority and are now being mailed out as rapidly as is possible to the more than 10,000 electrical contractors who have sent in their applications for these labor posters. Because of the large volume of work that the Government printing office has been called upon to do, there has been a much greater delay in receiving these labor posters than was anticipated by the Code Authority.

Copies of this official labor poster must be posted conspicuously in the establishments of all electrical contractors in accordance with the law, and all electrical contractors who have not already filed with the Code Authority their applications for the labor posters should do so immediately in order that they may comply with the law.

CANAL ZONE AND ALASKA BIDS

The Code Authority has authorized the establishment of bid depositories for the filing of bids on projects located in the Canal Zone and the Territory of Alaska as follows:

Canal Zone—Bids to be filed with the Miami, Fla., bid depositories located at the Builders Exchange, % Paul Hinds, 14th St. and N. Miami Avenue, Miami, Florida.

Alaska—Bids to be filed with the Seattle, Wash., bid depository located at the Seattle Construction Council, % H. V. Bogert, 4134 Arcade Building, Seattle, Wash.

WHAT THE CODE REQUIRES OF EVERY ELECTRICAL CONTRACTOR

Filing Copies of Bids.

1. Copies of all bids must be filed with the bid depository for the area within which the job is located, if the job amounts to the minimum bid limit established for that area (and in all cases bids of $250 or over must be filed).

2. Remittance for filing fees must accompany copies of all bids when filed with bid depositories.

3. Failure to file copy of any bid is a Code violation, subject to penalties provided under the Code and in case of bids on any work involving Government money such violation may subject the violator to elimination from bidding on Government projects.

4. In case of doubt regarding location of bid depository for any area, inquiry should be made through the Electrical Contractors Code Authority headquarters, 420 Lexington Avenue, New York City.

Registering Contracts.

1. For all areas where Local Administrative Committees have been appointed, all electrical work, whether taken on contract, time and material or percentage basis, amounting to $250 or over must be registered through such Local Administrative Committee and an assessment fee of 1/10 of 1 per cent of the amount of the contract (or estimated amount of the time and material or percentage job) paid to the local administrative committee as the pro-rata share of such work in support of the local administration of the Code.

2. Application for registration of all such jobs must be made to the local administrative committee on the blue form furnished by the local committee.

3. If the amount of the project is $2,000 and over the local administrative committee will forward the application for registration to the Code Authority which will secure a certificate of registration from Washington and furnish same to the electrical contractor to be posted on the job.

4. When a project is located in an area where no local administrative committee has jurisdiction, no assessment fee for registration is required, but on all such jobs of $2,000 and over the application for registration in duplicate must be sent directly to the Code Authority and a certificate of registration secured from Washington.

Support of Code Administration.

Every electrical contractor is required to assume his equitable share of the cost of the administration of the Code in the following three ways:

1. By the payment of his filing fees to the local administrative committee at the time of filing copies of all bids with the bid depository.

2. By paying the local administrative committee a fee of 1/10 of 1 per cent of the amount of the contract or estimated total value of the job upon all projects amounting to $250 or over.

3. By paying his monthly assessment to the Electrical Contractors Code Authority in support of national, regional and district expenses, such assessment being based on 1 per cent of productive payrolls, which is equivalent to approximately 2/5 of 1 per cent of the amount of electrical construction work or services.

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Jefferson Fuses Protect Motors and Payrolls

Anybody knows that production interruptions are expensive. Machines and motors must have protection . . . fuses . . . but time-costs need protection, too. Fuses that blow on harmless overloads mean payroll losses.

Jefferson Super-Lag Renewable Fuses are the perfect answer. They provide reliable, *accurate* protection—ride over all harmless surges, operate positively on dangerous overloads. There is no better protection for electrical equipment and property.

Jefferson Super-Lag Fuses are made in all capacities, both knife blade and ferrule types. Show the savings—tell the Jefferson Super-Lag Story and sell more fuses.

JEFFERSON ELECTRIC COMPANY
BELLWOOD *(Suburb of Chicago)* ILLINOIS

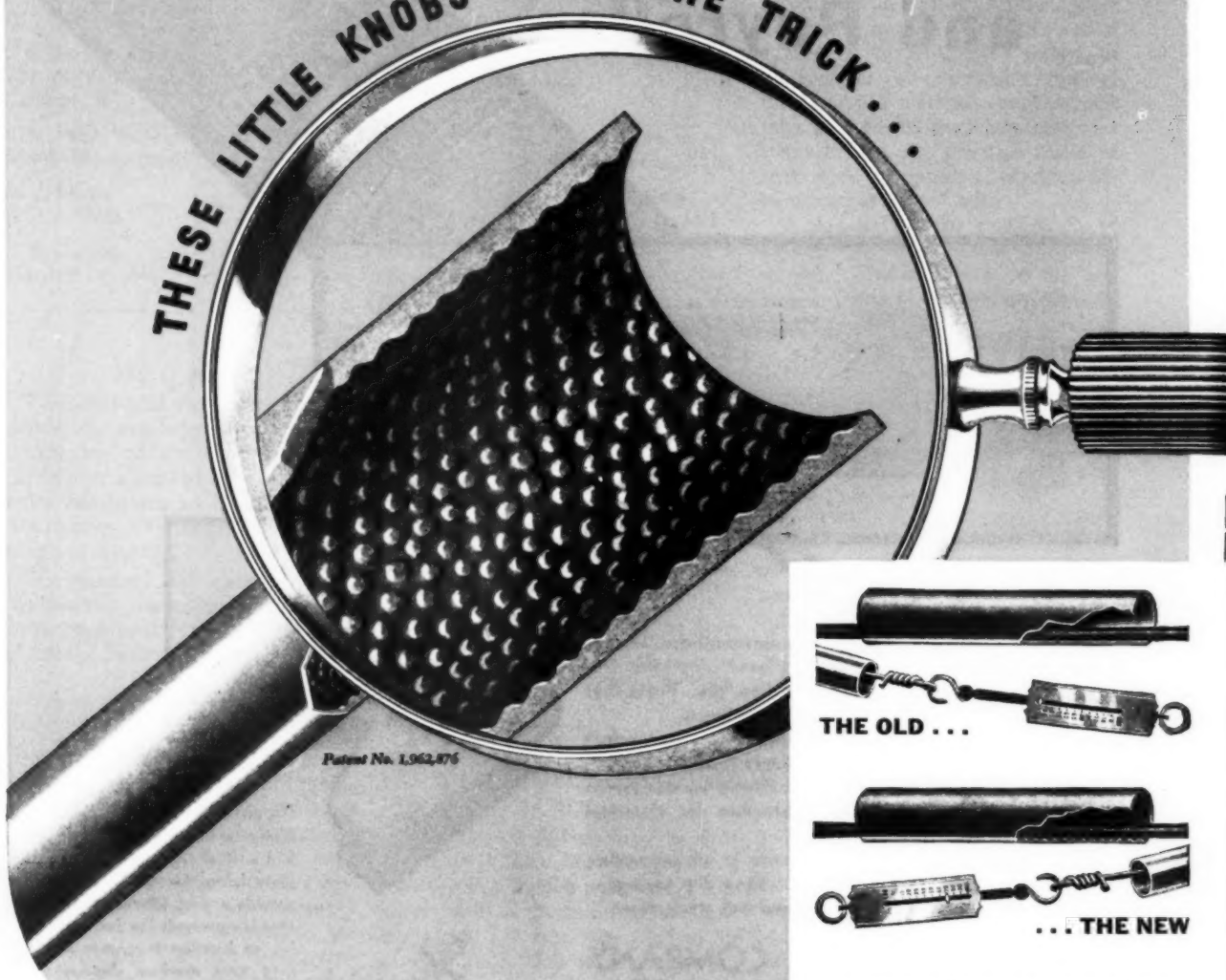
The secret of Jefferson Super-Lag performance lies in the lag plate which is a part of the Super-Lag link. This plate delays the normal fuse action to provide a time interval or lag. This time-lag prevents the fuse from blowing on harmless temporary overloads —to save needless shutdowns and many link replacements.

JEFFERSON Super-Lag RENEWABLE FUSES

[B-130-K]

THE EASIEST WIRING

THESE LITTLE KNOBS TURN THE TRICK . . .



Patent No. 1,962,876

THE OLD . . .

. . . THE NEW

Electrunite Steeltubes Conduit with the knurled inside finish showed by actual test a saving of 30 per cent in the effort required to pull cable through. The cable rides the tops of the tiny knobs instead of making contact the entire length.

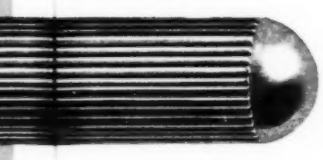
ELECTRUNITE

REG. U. S. PATENT OFFICE

CONDUIT IN THE WORLD

ELECTRICALLY WELDED

It takes courage to break precedent—to laugh at time-honored practice—to bring out a new product radically different from all similar accepted products. And yet, that is what ELECTRUNITE STEELTUBES is.



For years, the aim of every conduit manufacturer has been to produce the smoothest possible inside surface, so that wire would slide easily. But the wire didn't always do what was expected. There was too much of it in contact with the wall of the conduit. There was too much friction. So Steel and Tubes, Inc., figured out a method for keeping the wire away from the conduit wall. Tiny knobs, like ball bearings, were raised on the inside surface, so that the wire made contact only on the tops of the knobs. And the result?

ELECTRUNITE STEELTUBES is the easiest wiring conduit on the market. Tests show a reduction of approximately 30% in the effort required to pull wire in this modern electrical metallic tubing. Every user, after the first trial, has been enthusiastic about the new inside finish.

Every electrical contractor should consider ELECTRUNITE STEELTUBES when jobs must be figured close. The savings it introduces may mean the difference between landing the contract and losing it, and the difference between a profit or a loss when the work is completed.

Ask your Supply House to give you additional information, or write us.

Electrical Division

STEEL AND TUBES, INC.

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND • • • OHIO

A UNIT OF REPUBLIC STEEL CORPORATION

Knurled inside finish available in ½", ¾" and 1" sizes.

Steeltubes

CONTRACTING news

INFORMATION OF INTEREST TO ELECTRICAL CONTRACTORS CONSISTING OF ITEMS OF NEWS, SHORT ARTICLES, PRACTICAL IDEAS, ETC., OUR READERS ARE INVITED TO CONTRIBUTE TO THIS DEPARTMENT

AREA AGREEMENT HEARINGS

On August 15, 16 and 17 the first hearings on area labor agreements under the Electrical Contractors' Code were held in Pittsburgh, Detroit and Chicago respectively.

Objections were raised by both the organized manufacturers and the building owners and managers. In both cases the objectors wanted to be free to use their own electricians for maintenance and new work. The difficulty was in determining what was new work.

The terms "permanent employee" and "employed for six months" were questioned. The deputy administrator repeatedly stated that an electrician did not have to be in the employ of an owner or tenant for six months in order to be permanently employed but if he were discharged for other than cause prior to six months the owner would not be able to claim exemption.

The hearings were adjourned to permit the filing of briefs and other data and to secure assent or dissent from contractors who have not previously been canvassed.

MEETING OF CODE AUTHORITY

The second two-day meeting of the Electrical Contractors Code Authority held in Chicago, Ill., on August 14 and 15, was largely a matter of routine work.

The request for an amendment to the Code to cover the retail lighting equipment industry was denied.

A National Trade Practice Complaints Committee was appointed consisting of the entire Code Authority.

Standards for safety were approved to be printed so contractors could hang them up on jobs.

It was voted to request N.R.A. for a hearing on the automatic stays or exemptions to the Code granted to a list of 146 manufacturers and N.E.M.A. with 800 members.

The Code Authority discussed a number of important code violation cases, deciding in each case to push for prompt action.

INSPECTORS' CONVENTIONS TO HEAR UTILITY N.E. CODE DRAFT

Programs for the forthcoming regional conventions of the International Association of Electrical Inspectors include the first presentation to an industry group of the utility industry's suggestions for redrafting the present National Electrical Code. This redraft, representing the utility's version of Code standards, was prepared independently of the Electrical Committee over a period of four years' study. W. H. Horton, sales promotion manager, West Penn Power Co., will present this matter at the Eastern Section meeting to be held at Washington, D. C., on September 4 to 6. Similar presentations are planned for the Western Section meeting at Cincinnati, September 10-13; Northwestern Section at Portland, September 17-19; Southwestern Section at Sacramento, Calif,, September 24-26, and Southern Section at New Orleans, October 1-3.

At the Eastern Section meeting and also at the Cincinnati Western Section meeting, L. E. Mayer, chairman of the Electrical Contractors Code Authority, will make addresses on "The Inspector's Part in the N.R.A." V. H. Tousley, I.A.E.I. secretary, will also appear on the Eastern Section program in an address, "How an Inspector Can Play His Part in the NR.A."

BUILT INDUSTRIAL RANGE AND HEATER BUSINESS: Orval Poehlman, Milwaukee contractor, did industrial wiring till Old Man Depression came for a long stay. Then he used his contacts to sell water-heaters and range installations. Not only has he sold them to shop foremen and superintendents of his acquaintance but is selling heaters in plants for shower baths and general cleaning purposes. The low power rate for industrial use gives him an excellent talking point. Every employee of this firm has an electric range.

INSPECTORS TO COOPERATE WITH CONTRACTORS CODE AUTHORITY

The officers and members of the executive council of the International Association of Electrical Inspectors have, at the request of several chapters, expressed by resolution the desire of the association to cooperate with the Electrical Contractors Code Authority in the enforcement of the Code. The resolution follows:

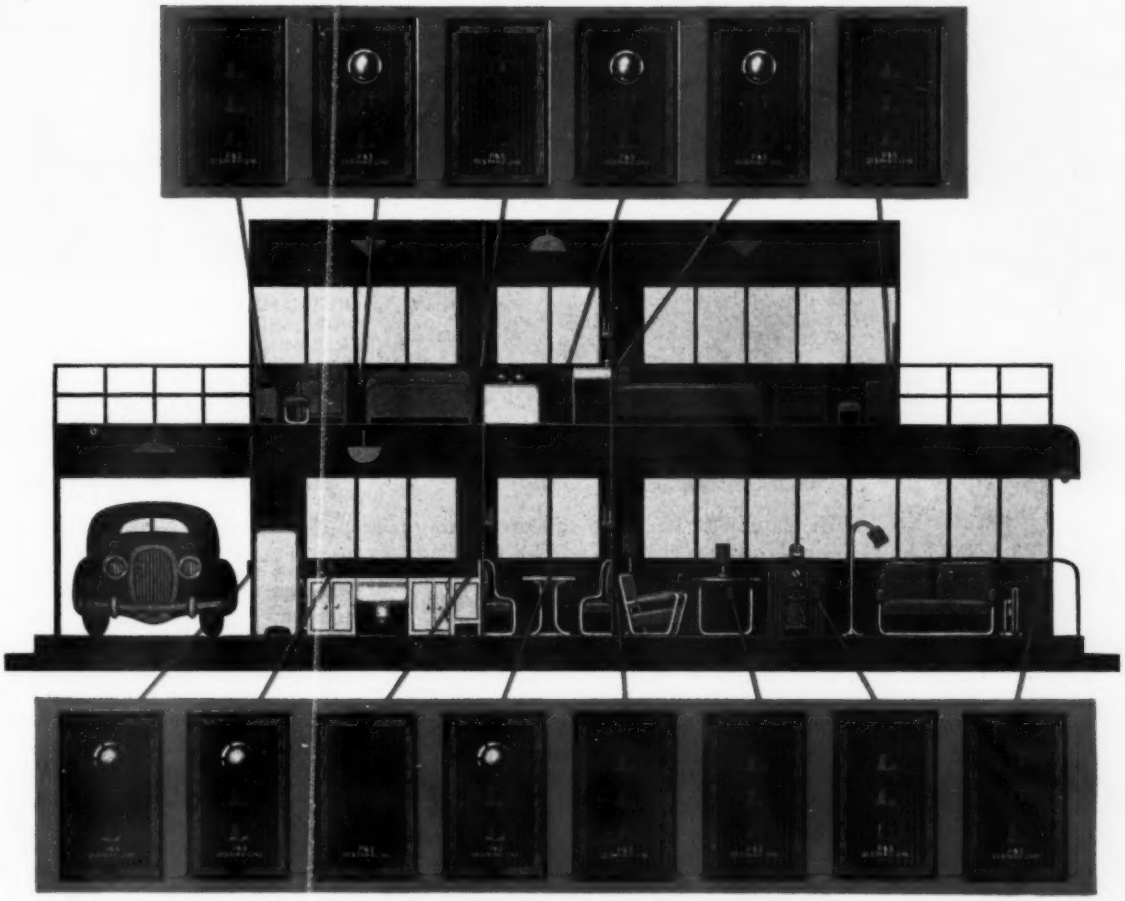
Resolved, That the International Association of Electrical Inspectors expresses its desire and willingness to cooperate with the National Electrical Contractors' Association and the Code Authority in the administration and enforcement of the electrical contractors' code.

BETTER LIGHT—BETTER SIGHT BUREAU ORGANIZED

The Better Light—Better Sight Bureau became a definite organization at a meeting held in August at Rye, New York, when officially appointed representatives and others authorized to represent their respective associations and groups met to review lighting activities of last year, consider the formal organization of a bureau to function for all interests and associations allied in promoting eyesight conservation and study ways and means of developing extensive promotional, advertising and sales

UMI

GO MODERN *with-*



the P&S-DESPARD LINE

● **Announcement of the Government's great housing program again re-opens two major markets to both contractor and jobber—modernization work and new building.**

● **To properly service the many time-saving electrical appliances that will of necessity go into these homes, an adequate wiring system will be needed—old time wiring methods will be scrapped—new modern materials will be given preference.**

● **Get the facts now on the P&S-DESPARD LINE and be prepared to meet competitive bids with a better and more modern product.**

PASS & SEYMOUR, INC.

SOLVAY STATION **SYRACUSE, N. Y.**

UMI

THE ENEMY OF EFFICIENCY

THEY laughed when he sat down to play. Who wouldn't, especially if he wore boxing gloves? But, inefficiency in business is no laughing matter. Good work can't be done without the right tools . . . and poor materials are likewise dangerous enemies of efficiency.

One of the wastes in your business may be the use of inefficient Friction Tape. Why not find out if you are getting the most for your Friction Tape dollar? Try DUTCH BRAND. There is no doubt that this "Extra Service" product can save you money. Write us on your firm letterhead for a free test sample!

DUTCH BRAND Friction Tape, Rubber Tape and Soldering Paste are sold by electrical jobbers everywhere.

VAN CLEEF BROS. Est. 1910

Manufacturers Friction and Rubber Tape and Soldering Paste
Woodlawn Ave., 77th to 78th Streets, Chicago, U. S. A.

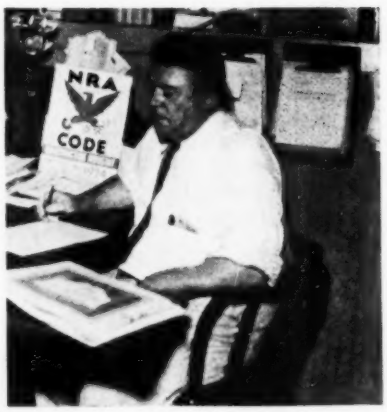
DUTCH BRAND SOLDERING PASTE
A scientific mixture—non-corrosive. Cleans as it works. Holds solder fast. Less paste required per job.

THE JUMBO PACKAGE
Contains 10 standard No. 8 rolls. The economical way for repairmen, electrical contractors and industrial users to purchase Friction Tape, where individually cartoned Tape is not required.

DUTCH BRAND RUBBER INSULATING TAPE
Fuses instantly without heat. Molds into one solid piece. It s-t-r-e-t-c-h-e-s without breaking because it contains more live, new rubber.

This Dispenser will increase your retail sales over 100%. It will sell Tape to people who had no intention of buying.

See the DUTCH BRAND EXHIBIT *at* A CENTURY *of* PROGRESS-CHICAGO-1934



INSTALLED FIRST TERRE HAUTE CONDUIT JOB: Millard W. Nehf, Nehf's Hardware & Electrical Shoppe, Terre Haute, Ind., claims the distinction of having installed the first conduit installation in that city for a 6-story department store built in 1907. A large out-of-town sign firm has just placed an open order for all their Terre Haute sign work with this firm, stating in their authorization letter that this action was prompted by recommendations received from local business men. Mr. Nehf is secretary and treasurer of Terre Haute Chapter, N.E.C.A.

programs as a central bureau operation and more specifically, within the membership of the various groups and associations.

The representatives of the fifteen industries present voted unanimously for formal organization of the Better Light—Better Sight Bureau. An adequate set of By-Laws were adopted. M. E. Skinner of Niagara Hudson Power Corporation was elected chairman, and G. R. Trumbull was appointed manager-secretary.

AVOIDS FLAT PRICE FOR RANGE WIRING

The price of range wiring done by contractors for the Indianapolis Power and Light Co. is based on the actual costs incurred in each specific installation, plus a predetermined markup, according to Ted C. Brown, Electric League secretary-manager. He further states that all range work is only given out by the utility company to contractor members of the league.

Utility field men make a preliminary report of material required for the job before its assignment to a contractor. A committee of five persons makes a monthly review and tabulated report of prevailing market costs of materials used in range wiring so as to eliminate possible errors in computing job costs. The local utility, jobbers, smaller contractors and larger contractors each have a

MAKE THESE TESTS

Compare the Dayton Cog-Belt with any other V-Belt in vital principles of construction

First, mark two points four or five inches apart on the outer surface of a belt. Then bend the belt *double*. And while doubled, measure the distance between the marks again. Note how far the outer section of the belt has stretched. This shows how the outer section of any belt must stretch when going around a pulley.

The Dayton Cog-Belt is the only V-Belt built to take this "stretch" without strain or distortion. The outer section is made of bias-cut fabric—it "gives" without strain; like pulling your handkerchief from diagonally opposite corners.

Also, while the belt is flexed, note how the cogged inner surface has compressed—how the cogs have closed and "taken-up" the compression on the inner surface of the belt.

Second, compress a section of a Dayton Cog-Belt between the thumb and forefinger and note the extreme crosswise rigidity. Because of this positive crosswise rigidity there can be no "squashing" in the pulley groove . . . no distortion or twisting.

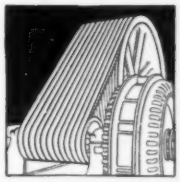
No other V-Belt combines such extreme flexibility with such positive crosswise rigidity.

And because Dayton Cog-Belts offer these exclusive advantages—because they are *built to bend*—because they have such positive crosswise rigidity—they provide maximum contact arc, have greater gripping power, permit smaller pulleys with closer centers, save floor space, run cooler, require less tension, are easier on bearings, last longer.

But don't stop with making these tests. Let us give you more of the facts—facts that prove how Dayton Cog-Belts are more efficient and, at the same time, how they save you money in many ways. Your inquiries are invited.

THE DAYTON RUBBER MFG. CO.
DAYTON, OHIO

Factory Distributors in Principal Cities and all Westinghouse Electric and Manufacturing Company Sales Offices

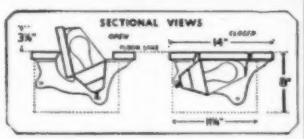


Dayton

COG • BELT DRIVES

Also manufacturers of Dayton Fan Belts . . . Dayton Red Tube Radiator Hose . . . and the famous Dayton Thorobred Tires and Tubes

Disappearing FOOTLIGHTS



ESPECIALLY devised for school auditoriums and other installations where footlights are only occasionally required.

When not in use they close down flush with the stage floor, leaving an unobstructed platform.

THEY are made in several models; furnished completely assembled and wired in standard five-foot lengths, ready for installation. They offer all the advantages of permanent footlights—light intensity, color lighting, and remote control—with the additional disappearing feature. And are of the same design as the Kliegl disappearing footlights so successfully used in the Radio City Theatres. You can recommend and install them with complete confidence in their practicability and high efficiency.

NEW CATALOG—*have you a copy of our new complete Catalog "B"? It contains a lot of useful information. If not—write for a copy.*

KLIEGL BROS

UNIVERSAL ELECTRIC STAGE LIGHTING CO., INC.

Theatrical · Decorative · Spectacular · Lighting

321 West 50th Street · New York, N.Y.

Beating Competition with Brains

Competition is tough in the electrical contracting business these days; and every day it gets worse. Successful contractors have found they can beat fly-by-night competition best by using their brains, and by educating their responsible employes. You can help your head men to keep abreast of the times and save you money by sending each his own copy of ELECTRICAL CONTRACTING.

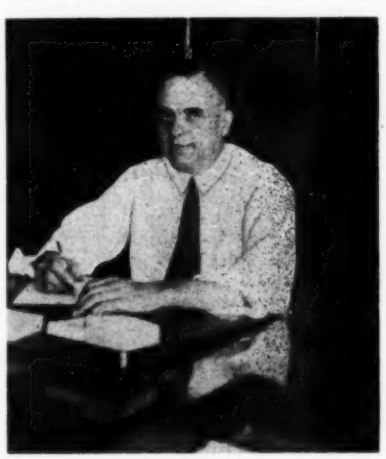
member on this committee with the league secretary as chairman. A committee of five contractors reports through the league secretary any questions of procedure or policy which affect their dealings with the local utility.

PEORIA ORDINANCE COVERS REINSPECTION

The 1934 Electrical Inspection Rules and Regulations for Peoria, Ill., require a semi-annual reinspection of electric wiring of all buildings in fire zones and all non-residential buildings outside the fire zone.

Minimum reinspection fees are $1.00 for the first four branch circuits or less, plus 10 cents for each additional circuit. Thirty days' time is allowed for making such changes or alterations as may be ordered by the electrical inspection department, after which time the ordinance provides a schedule of fines for noncompliance.

Approved metal conduits or metal moldings are required for all installations, rigid iron conduit or electrical metallic tubing being optional for new services. Electric signs must be supported in a fixed position with rigid conduit connections made thereto.



LEAGUE AIDS CODE BODY: The St. Louis Electrical Board of Trade has extended the services of Secretary-Manager Carl H. Christine and its office facilities to aid the local electrical contractors' code administrative committee. Mr. Christine has, therefore, been named secretary and treasurer of the latter body. Mr. Christine is also secretary-manager of St. Louis Chapter, N.E.C.A., secretary, Electrical Contractors of St. Louis (a union employers' group within the St. Louis Chapter), and also acting secretary of the district agency for the radio wholesaling trade.

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This combination MADE NEWS

FLAME RETARDING
SAFECOTE
MOISTURE RESISTING

U. S. LETTERS PATENT NUMBERS:
1,772,434
1,918,796
OTHER PATENTS PENDING

PLUS

AMERICORE
(CODE)

AMPARAK
(INTERMEDIATE)

AMERITE
(30%)

For maximum performance in

RUBBER COVERED WIRE

ALWAYS accepted as the highest possible standard for quality—**American Steel & Wire Company Building Wires** now offer the many added advantages of **Safecote** finish. Good news, indeed, because, in addition to superior construction and proved performance of the wire itself—this remarkable finish will not carry or support flame—pulls more easily—does not soften or crack and is impervious to moisture. Furnished in all standard colors and made in sizes No. 18 AWG to 2,000,000 CM. Send for a sample—put a flame to it—bend it—and you will understand why **Americore**—**Amparak** or **Amerite**—with **Safecote Finish**—will serve you better and more economically.

1831 MORE THAN 100 YEARS OF PROGRESS IN WIRE MAKING 1934

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago
94 Grove Street, Worcester

SUBSIDIARY OF UNITED STATES STEEL CORPORATION
AND ALL PRINCIPAL CITIES

Empire State Building, New York
First National Bank Building, Baltimore

Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco

Export Distributors: United States Steel Products Company, New York

GREENLEE Conduit BENDERS ARE MONEY SAVERS

Bending rigid conduit with a Greenlee. These Benders are convenient to operate and require very little effort, even for bending the larger sizes.

The statement that Greenlee Hydraulic Conduit Benders are money savers is not mere sales talk. We make it with confidence, because so many users have gone to the trouble to say so in letters to us.

These users tell of many cases where a Greenlee Bender has more than paid for itself on the first job. And any tool that pays for itself on the first job is surely going to save just as much money on every other job.

There are many reasons why this is true of Greenlee Benders, but they can all be summed up in the statement that they bend conduit faster and better than by any other method; that they eliminate the need for many costly fittings; and that they make it easier to pull in wire and cable.

We want you to know more about the improved benders shown here and how they will save money for you. Just use the handy coupon provided below. No obligation, of course.

Greenlee Rigid Conduit Bender. Built in two sizes for bending from 1¼" to 3" conduit and from 2½" to 4½" conduit.

Greenlee Conduit Bender with attachments for bending thin-wall steel conduit in sizes from 1¼" to 2".

Greenlee TOOL CO. GREENLEE

ROCKFORD, ILLINOIS, U.S.A.

Mail This Coupon To-day

GREENLEE TOOL CO., ROCKFORD, ILL. Date_____

Please send information on your improved Conduit Benders.

Name_____ Address_____

City_____ State_____

My Jobber is_____ 9-34

A ROLL O' TAPE

ELECTRICAL FLASHES GATHERED AMONG THE BIG WIRE AND PIPE MEN BY ELECTRICAL CONTRACTING'S FIELD EDITORS

A GOOD takeoff—Terre Haute, Indiana street lighting materials included an item of 78,000 ft. of underground cable, per city electrician Mooter's estimate. M. P. Murphy Co. of Detroit did the job with 77,500 ft. of cable.

THE E. O. Dorsch Electric Co. offices at St. Louis reflect an atmosphere of pride in their large completed commercial and industrial jobs, judging from the neat arrangement of framed job photographs about the walls.

MAX CHANEY, president of the Chehallis (Wash.) Electric Co., explained that since he took on a line of oil burners recently he has some 60 burners to service, including those he sold himself. This service work, together with periodic cleanings has been quite a help in dull times.

BUSINESS men sometimes question an electrical contractor's fishing trip photos, says Fred A. Rick of the Rick Electric Company of St. Louis, therefore a 6-ft. tarpon is very neatly mounted in his office where all may see for themselves.

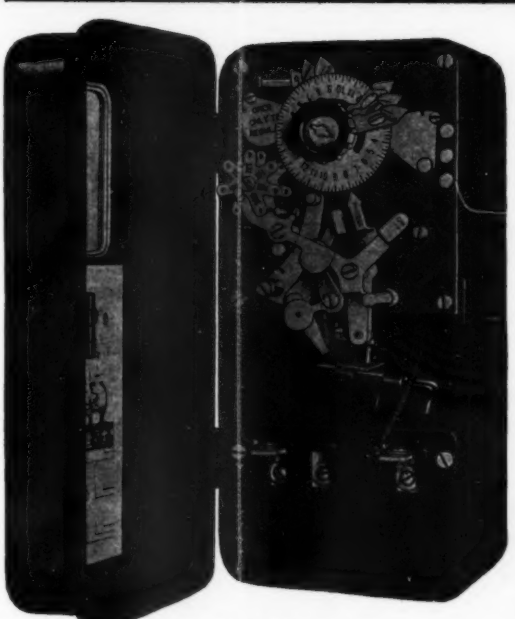
WRITTEN requests for a revision of the St. Louis electrical ordinance to permit 1933 National Electrical Code rules to govern the installation of electrical metallic tubing, have been filed by electrical contractors with the Code Committee of the St. Louis Electrical Board of Trade.

HOT stuff—erecting a large electric sign around the sides of a 115 ft. tall 14 ft. diameter power-house smokestack, boilers going full blast and old Sol doing likewise. Ruesch Electric Co., Peoria, Ill., sign specialists, had this job at a new local distillery plant. Twenty-

SANGAMO

— in addition to its Complete Line of A. C. TIME-SWITCHES —

announces



FORM TW-11
SINGLE POLE, SINGLE THROW

A New Moderately Priced Electrically Wound

DIRECT CURRENT TIME-SWITCH

The Form TW Time-Switch, for direct current service only, is offered as a less expensive, but rugged and dependable unit for those installations where the required accuracy of timing does not justify the use of the more expensive Type TC, full jeweled line. While the Form TW is announced as a new time-switch, its principal component parts have been used satisfactorily for years in other Sangamo products.

SANGAMO D.C. TIME-SWITCH
FORM TW
4¼" Wide, 9¼" Long, 4½" Deep

FORM	NO. POLES	THROW
TW-11	Single-Pole	Single-Throw
TW-12	Single-Pole	Double-Throw
TW-21	Double-Pole	Single-Throw
TW-22	Double-Pole	Double-Throw

Distinctive Features

1. Electrically Wound
2. Jeweled Balance
3. Omitting Device Standard
4. Manual Operation without Disturbing Sequence
5. Dustproof Mounting
6. Pry-outs, at Bottom
7. Advanced Time Cut-Off Optional
8. Built and Fully Guaranteed By Sangamo

SANGAMO ELECTRIC COMPANY
Springfield, Illinois

SANGAMO
Precision **TIME-SWITCHES**

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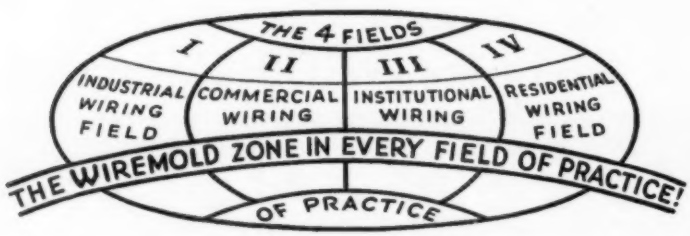
THE WIREMOLD ZONE

NO. 1 OF A SERIES ON WIRING OPPORTUNITIES



Sooner or later every wiring job comes to the surface as a problem!

WISE contractors, engineers and architects do not try to avoid or evade this problem. Instead, they undertake to meet it *intelligently*.

First—*as a matter of foresight*—by planning and installing each wiring job so that inevitable changes in and extensions from each circuit can be made with the least trouble and expense.

Second—*as a matter of skillful practice*—by making these changes and extensions, when the need finally comes, without muss or fuss or interruption of business.

In both cases Wiremold provides the simple and practical answer!

For there is a Wiremold ZONE OF USEFULNESS, of economy, of convenience—in every field of wiring practice.

THE WIREMOLD COMPANY, Hartford, Connecticut

two 300 lb. letters, 6 ft. by 5 ft. and three 900 lb. emblems, 11 ft. by 7 ft. were mounted at extreme top of stack.

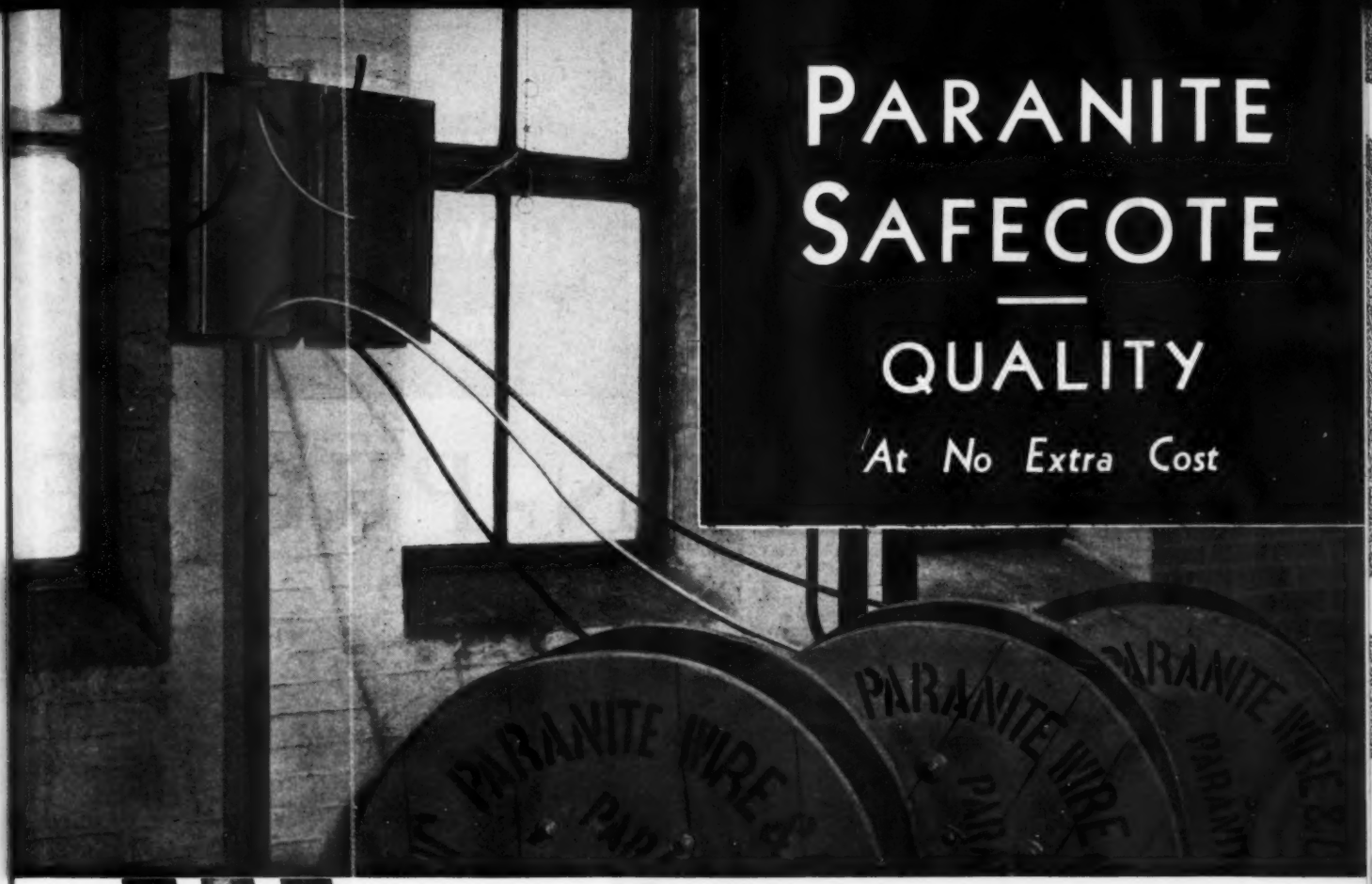
"OUR own" radio broadcasters. Earl N. Peak, Code Authority vice-chairman, owns and operates station KFIB at Marshalltown, Iowa, while KMOX of St. Louis, Mo., has its transmitter station located on the Meramac River estate of the Briner brothers, pioneer St. Louis electrical contractors and motor men.

JIM CASEY, old-time member of Local No. 1, I.B.E.W., of St. Louis, recently relinquished the presidency of his organization after serving as president of that local almost continuously for 20 years.

AN "undersea" room decorated to represent scenes at the bottom of the ocean, and with various species of mounted fish cleverly placed in walls, is the hobby of a wealthy St. Louisian. The Burton Electric Co., St. Louis, is installing therein a unique mobile color lighting and control system, using 100 25-watt reflectors and roundels in three colors, concealed around perimeter of room be-

---

PROPRIETOR AND MANAGER: There are plenty of women connected with the electrical contracting business in one capacity or another. But there are not so many who own a business of their own and run it, both the store end and construction end. Here is one of them, Grace Lambert, proprietor of the City Electric Co., Aberdeen, Wash. Of course she does not go out and estimate and superintend wiring jobs. She has a very capable foreman for that part in Lloyd Bowen. She is about to make an important move now by going into a completely remodeled store along with the Casey Hardware Co. In the community, it will go down as a consolidation, but the two businesses will be run separately. Both expect better business as the result of increased store traffic.



PARANITE SAFECOTE

QUALITY

At No Extra Cost

Costs No More to Buy

PARANITE SAFECOTE

If it's Paranite it's Right—that holds true of Paranite Safecote Wires and Cables. The same high quality which has always been identified with Paranite products is in Paranite Safecote.

Why not then demand Paranite Safecote? It will not support or carry flame, won't crack or soften and pulls easily. Impervious to moisture as well.

Furnished in all standard colors and sizes from No. 18 to 2,000,000 CM. Ask for a sample and test it. You'll then know why it pays to use Paranite Safecote and all other Paranite Wires and Cables—they're "more than Code requires."

IF IT'S **PARANITE** IT'S RIGHT

PARANITE WIRE & CABLE CORP.

JONESBORO, INDIANA

Division of

ESSEX WIRE CORPORATION - Detroit, Michigan

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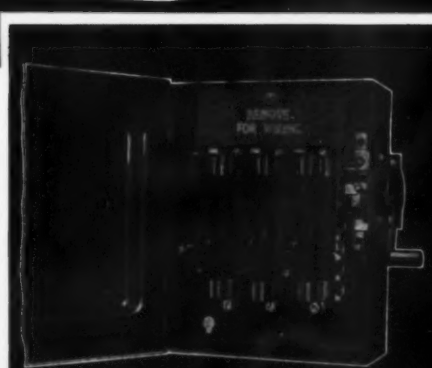
CUTLER HAMMER

BRINGING STEEL MILL STANDARDS, HEAVY-DUTY MECHANISM, to SAFETY SWITCHES

EXPLOSION-PROOF
SAFETY SWITCHES

For Class I, Group D locations (gasoline, alcohol fumes, etc.) ***In non-fusible, 30, 60, 100 and 200 amp. sizes, single and double throw, quick make and quick break . . .*** **Equally suitable C-H Safety Switches** ***are offered at less cost for all lesser hazards*** **(*dust, lint, etc.*) . . . Also a complete weather-proof line,** ***enduringly protective, not made with perishable gaskets.***



Especially small ***in size, due to use of the time-tested mechanism used in Bul. 4115 Type A Safety Switch at right—compact, with high arc rupturing capacity, and torque spring mechanism.***

(B-278)

THE exacting requirements of heavy-duty industrial and steel mill motor control serve to set Cutler-Hammer's one design and manufacturing standard; at C-H, apparatus is not and cannot be made any other way.

As an example, in safety switches C-H uses a tried and proven switching mechanism built to the same standards of design as heavy duty C-H Control devices. Throughout the explosion-proof line the same kind of plus value is evident—in more-than-ample case strength—in joints accurately machined and of full required width—in features of design and construction that mark their superiority.

Such a background insures complete user satisfaction and offers sellers the greatest of opportunities for prestige and profit. Alert independent electrical wholesalers stock the complete C-H Safety Switch Line. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1306 St. Paul Avenue, Milwaukee, Wisconsin.

• • •

Meter Service Switches by Cutler-Hammer, ***of types approved in most localities, are built to the same standards as C-H Safety Switches. Ask for catalog.***

UMI

hind a rigid valance, operated by motor driven remote controlled dimmers. A wide range of colors are easily obtainable in variable cycles of intensity, through special switch connections controlling the three dimmer motors. The remote control switch panel is made accessible to guests for their amusement in painting with colored light.

SIMPLE static electricity test—hold cotton or worsted fibres near device to be tested. If an appreciable electric charge is present the fibres will repel each other. A Neon gas glow tester, static voltmeter or a gold-leaf electroscope are instruments used for such tests when available.

THE Fraser-Morris Company, Minneapolis, recently sent a card, CALL GENEVA 0822 IF IT'S ELECTRICAL with a brief list of the services they offer to 450 names on their books. Three days after this mailing customers had called for $60 worth of work as a result. With every repair job this contracting firm leaves a card in the fuse box. When a customer has trouble he looks first in the fuse box—and finds Fraser-Morris' card with the telephone number and address.

RALF TOENSFELDT, chief electrical engineer for the city of St. Louis during the designing and installation of its extensive street lighting system, also during the construction of the recently completed Municipal Auditorium, has been succeeded by Charles Meichels, who is now the acting head of that office.

FORTY-EIGHT houses are to be built in Decatur, Ind., by Decatur Subsistence Homesteads, Inc., for which 40 contractors in all parts of the United States have requested plans. Some job for the L.A.C. in Decatur to tabulate these bids.

SOME time ago Minneapolis had a campaign for strict enforcement of the smoke ordinance. The Pierson-Wilcox Electric Company seized the opportunity to sell an electric eye installation for chimneys which, when the smoke became dense, would cause a bell to ring in the engine room, and probably save a fine.

SHORTAGE of funds at Fort Wayne, Ind., resulted in the removal as of July 31 of Martin Braun, city electrical inspector. A substitute arrangement provides for electrical inspections to be performed by other non-electrical employees in the city building inspection department. Former inspector Braun had been in the city service for four years and was active in inspection affairs, being at the present time the chairman of the Indiana Chapter, Western Section, I.A.E.I.

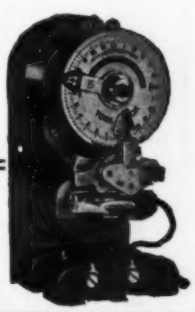
Do You Suppose it is Psychological ?

For years we have wondered!

Why is it that TORK Clock sales take such a jump when September gets around. It seems that most vacations are over with Labor Day and everyone goes seriously back to work. Fall Merchandising—and then the Holiday business is only two months away, so sales resistance is now at a low ebb. Your activities can be profitably directed for economical improvements in Window and Sign Lighting. TORK Clocks make the ideal basis.

All-Electric models are now made from 5 to 100 ampere capacity in 1, 2 or 3 poles, with free wheeling dial and complete freedom of hand operation. SIMPLE TO INSTALL AND OPERATE.

ASK FOR CATALOGUE



THE TORK CLOCK COMPANY, Inc.
MOUNT VERNON NEW YORK
"The pioneers in time switch popularity"

McGILL 2-Circuit Switch

for the new three light Lamps

●

Reasonable in Cost

●

An Unusually Wide Range of Usefulness

Here is a new model in the reliable McGill Levolier Line of Switches—designed to control the two filament lamps. The size is exactly the same as the well known Levolier No. 61 switch. It incorporates the lever operating mechanism and the easy-to-wire features found in all Levolier switches.

The market for the new three-light-level, two-filament lamps is extensive, so you will find many opportunities to utilize this new No. 201 Levolier two-circuit switch. It will give you an opportunity to build up an additional volume of profitable business.

Write us for complete information and price on this new No. 201 Levolier.

McGILL MANUFACTURING CO.
Electrical Specialties of Quality
ESTABLISHED 1904
VALPARAISO · INDIANA
Box No. 670

Reliable

KLING LAMP

LUGS

COST LESS than SOLDERING

1-One Piece
2-Stay Tight
3-Run Cool

These new Reliable Kling Klamp Lugs are the answer to low-cost installations. A sample will show you why you should use them on every job.

Net Prices of a Few Sizes in Carton Lots.

Strand Size	No. in Carton	Price Each
6	24	.085
2	24	.119
0000	12	.2975
400,000 CM	6	.5950

Discounts for Quantities
F. O. B. Warehouse

Distributed by Graybar

CLIP AND MAIL

Reliable Electric Company
3145 Carroll Ave.
Chicago, Illinois
NRA

Please send me your KLING LAMP Lug Folder with sample attached.

Name_____

Address_____

City_____ State_____

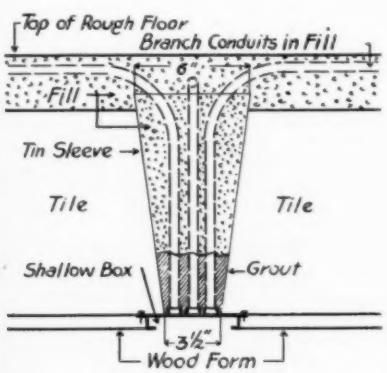
PRACTICAL METHODS

REFLECTOR CLAMP

Often it is desirable to attach an odd reflector, small plugging box or outlet box to a handy iron pipe in store, shop or office rather than resort to drilling into masonry for expansion shield supports. Temporary reflectors were needed for a special display in the Burton Electric Co. store at St. Louis, therefore outlet boxes complete with bushed extension cords and box attachment type reflectors were fastened to an unused 1 in. steam pipe by means of one hole cast conduit strap bolted to back of outlet box, after having been placed over pipe.

TILE ARCH OUTLET SLEEVE

An inexpensive, easily-installed ceiling outlet sleeve for tile arch constructed buildings permits the complete installation of branch circuit conduits on top of rough tile in one operation, ahead of floor fill pouring. A tapered tin sleeve, 3½ in. bottom diameter, 6 in. top diameter, usually 14 in. long with small end flanged out for nailing to rough form, is set on wood form and tile is built around it. After form is wrecked, this sleeve may be left in place or it can be easily removed by crushing in with a small pinch bar. A clean opening is now available for roughing-in the outlet with no damage or weakening of tile construction. Box or shallow pan is fitted tight against sleeved hole, which the box overlaps, being held in this position by the spring tension of stubbed down conduits. It is then cast-in by concrete grout poured around conduit stubs for a depth of 4 to 6 in. of sleeved hole. The balance of

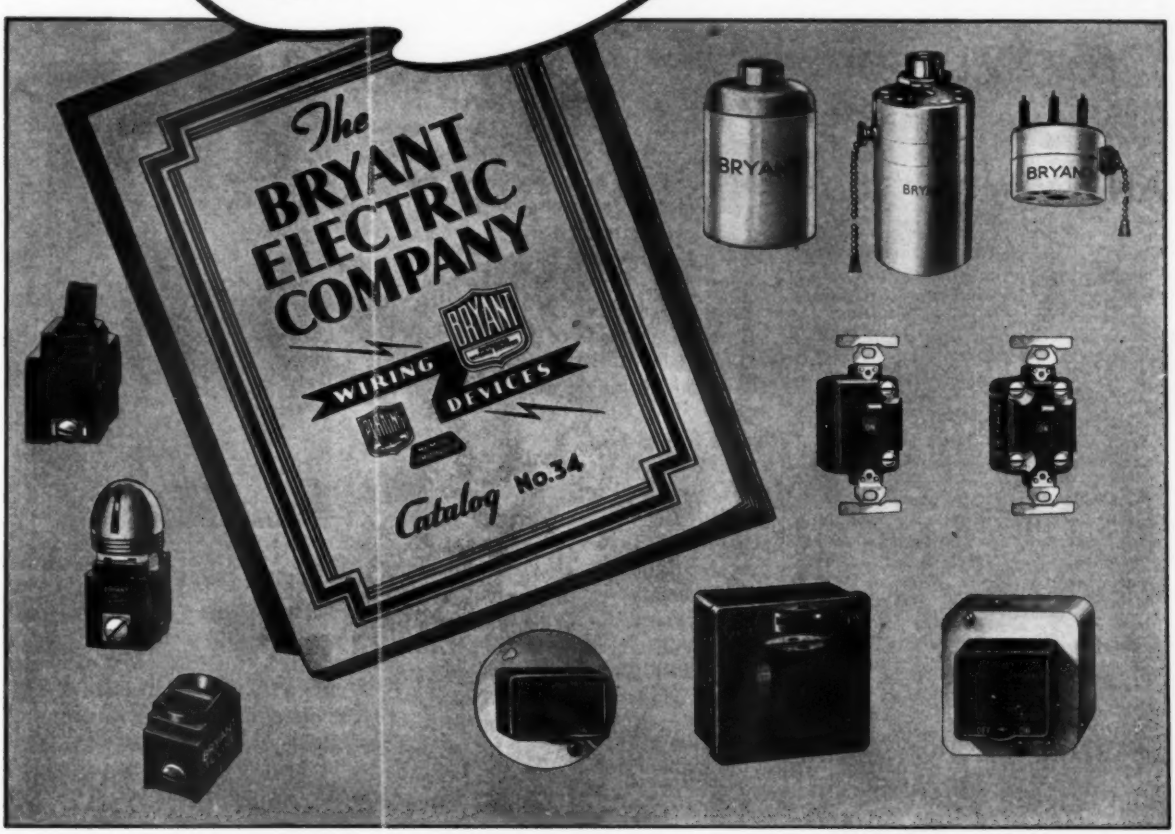


sleeved hole is later filled up in the floor fill pouring process. The foregoing method was followed by the Hatfield Electric Co. in wiring Cleveland's new Post-Office Terminal.

ARMATURE WINDING BENCH

A rigid yet adjustable armature and stator winding bench of steel frame and wood top construction is used in the Walker Electric Supply Co. motor repair shop at Terre Haute, Ind., for their special mine locomotive and coal cutting motor work, as well as for smaller motors of standard design. Easily adjustable 4 in. by 4 in. "V" slotted timber brackets accommodate armatures or rotors for very small motors up to 50 h.p. and even larger. The bench is 10 ft. long supported by six 1½ in. by 1½ in. angle iron legs 39 in. high. A 10 ft. by 4 in. by 1½ in. iron channel is bolted horizontally to front row of three legs, leaving 4 in. of angle iron projecting up at top of channel. A 10 ft. by 1½ in. by 1½ in. angle iron is bolted to back row of three legs, likewise with 4 in. leg projection above. The front and rear rows of three legs are joined together with three 39 in. long 4 in. by 1½ in. horizontal cross members

A New BRYANT Catalog! geared to the times....



COMPACT . . . COMPLETE . . . CONVENIENT

The catalog requirements of the architect, the contractor, and the wholesaler, were constantly kept in mind in the preparation of the Bryant 1934 Catalog. We are confident that all the trade will find it of handy size, complete as to data, and easy for reference.

If you have not received your copy write our nearest office.

BRYANT

BRYANT *Superior Wiring Devices*

Manufactured by THE BRYANT ELECTRIC CO., Bridgeport, Conn.

MANUFACTURERS OF "SUPERIOR WIRING DEVICES" SINCE 1888 . . . MANUFACTURERS OF HEMCO PRODUCTS

NEW YORK 60 East 42nd Street . . CHICAGO 844 West Adams Street . . SAN FRANCISCO 149 New Montgomery Street

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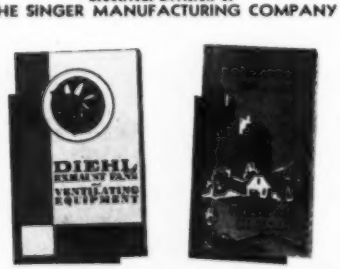
Now

FOR SALES OF EXHAUST FANS AND VENTILATION

Are you ready to figure successfully on the fall and winter exhaust fan and ventilating equipment business in taverns, stores and industrial plants? Here are two helpful booklets. They describe the newest Diehl products, including High Speed Exhaust Fans from 18" to 36" diameter, Low Speed from 18" to 48" diameter, Bucket Blade and Flat Blade Ventilating Fans up to 16", Automatic Louvres and Home Ventilating Fans.

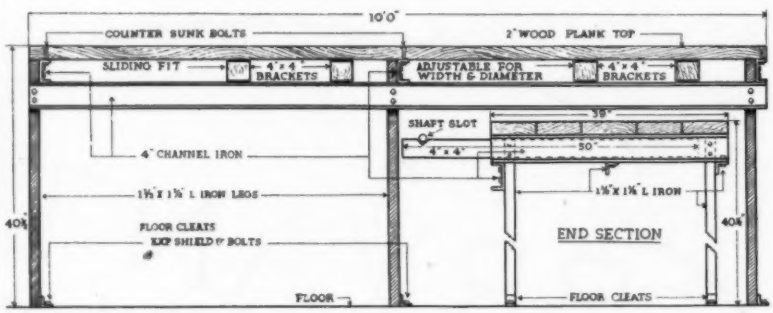
In addition, there are dimensions required for figuring an installation, prices and other data every dealer and contractor will find extremely useful. Copies gladly sent on request. Write to Diehl Manufacturing Company, Elizabethport, New Jersey, or to District Offices or Sales Representatives in Atlanta, Boston, Chicago, Cleveland, Dallas, Los Angeles, San Francisco, New York, St. Louis and Philadelphia.

DIEHL MANUFACTURING COMPANY
Electrical Division of
THE SINGER MANUFACTURING COMPANY



DIEHL FANS

●903

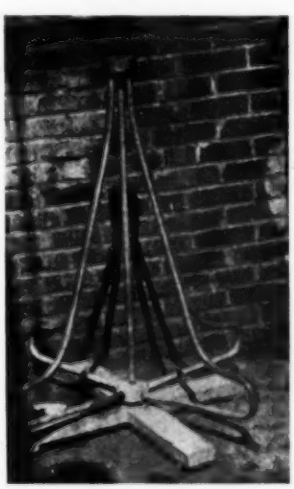


Details of Armature Winding Bench

bolted to 4 in. top projections of legs, with ends of cross members even with ledges of 10 ft. front channel and 10 ft. angle iron rear members. Two in. wood planks 10 ft. long are bolted to cross members with flat head countersunk machine screws. A third 10 ft. horizontal 1½ in. by 1½ in. angle iron is now bolted to under side of cross members, centered between front and back row of legs. Two pairs of 4 in. by 4 in. by 50 in. timbers are inserted for adjusting the armature or rotor brackets, in the 4 in. clear sliding space between under side of plank top and the top ledge of 10 ft. front channel, 10 ft. middle angle and 10 ft. rear angle. Each half of 10 ft. long bench has a 4 in. slot almost 5 ft. long in which the winder may shift these brackets to suit his wishes. Angle legs are bolted to floor by separate cleats or 39 in. angle legs may be made up with a turned-out bolting end when originally cut up for this assembly. This bench is 10 ft. long, 39 in. wide and 40½ in. high. The lack of bulky legs and braces facilitates cleaning out rubbish accumulation under bench.

PAYOUT REEL

A light-weight free spinning wire reel for general about-the-floor use was made out of 2 in. by 4 in. lumber and ½ in. bent conduit by the Chapline Electric Co., St. Louis. The wooden base consists of two 30-in. 2 by 4's bolted together at right angles, with a 40 in. ½ in. conduit mounted vertically through the intersection of wood members, secured thereto on top and bottom sides by locknuts. Next a flat bearing plate with ½ in. knockout, fitted around a ½ in. conduit stem is secured to wood base, followed by a 2 in. long nipple, telescoping the ½ in. conduit, this nipple resting and revolving upon flat bearing plate, its upper end serving as a stop-collar for coil rack

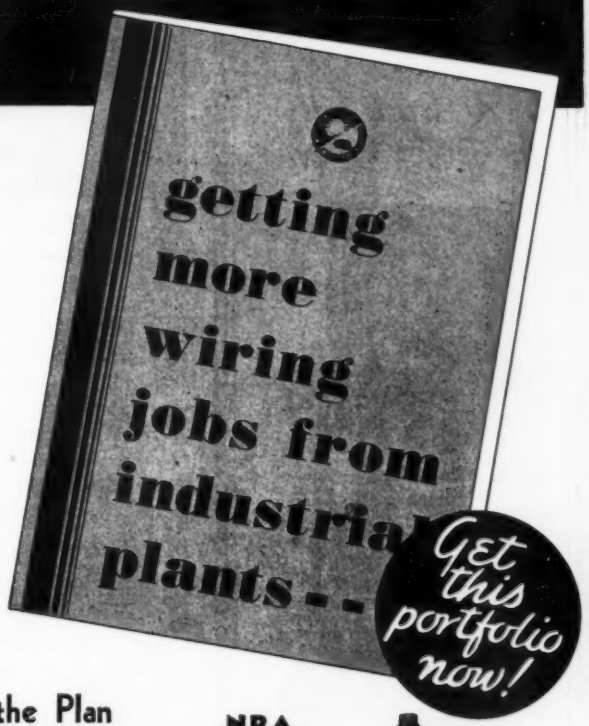


assembly. The coil rack consists of four pieces of ½ in. conduit bent to a flattened inverted question-mark pattern, the four bottom ends being lock-nutted into four side knockouts of an inverted octagonal outlet box, while the upper ends are lock-nutted into back of upper outlet box. The center knockouts of each outlet box provide the guide hole for vertical ½ in. conduit, this conduit being bushed at top end as a keeper for four piece coil rack. The overall width of pipe rack at widest point is 36 in.

FLEXIBLE OUTLETS FOR CONCRETE SLABS

To provide for greater flexibility for changes in ceiling lighting as well as future installations of floor outlets, A. S. Schulman Electric Co., Chicago, on the Chicago Post-Office job installed combination ceiling and floor outlet boxes back-to-back. They are designed to take care of new floor

BETTER LIGHT-BETTER SIGHT *means* BETTER BUSINESS *for* YOU!



This month the selling forces of the electrical industry are starting their drive upon a National Better Light—Better Sight Campaign. Better Light as an aid to Better Work will be the keynote of the drive. As never before the importance of the right kind of a lighting installation will be brought to the attention of industrial executives, superintendents of production and others charged with the responsibility of efficient and profitable management of industrial operations.

Your Opportunity for Better Business

Here is the opportunity for more business than you have had for years. Many industrial plants will decide upon the relighting of certain departments or probably the whole factory. Because of the emphasis the drive will give upon the idea of analyzing the specific task and fitting the light to that task, there will be opportunities for the installation of supplementary lighting of many kinds.

Here is the Plan

Send for the Benjamin Portfolio "Getting More Wiring Jobs from Industrial Plants". This gives you a complete advertising campaign for your own use over your own signature for use in your own locality, with simple, easily understood instructions for making effective use of the material. We have also prepared a "Six Point Plan", which shows six definite things that should be done about the lighting in an industrial plant to get full efficiency from the lighting system. This plan will also be sent to you.

The Benjamin Policy of Protection and Cooperation

The Benjamin policy of protection and cooperation will enable you to secure this business on a sound and profitable basis.

NRA MEMBER U.S. WE DO OUR PART

Feature "Type 79" Lighting Fixtures

For good general illumination and for many special lighting requirements, you will find the patented Benjamin "Type 79" construction will help you make industrial lighting sales. "Type 79" is now available with RLM Dome, Shallow Bowl and Elliptical Angle Reflectors, and also with the Benjamin Glassteel Diffuser.

BENJAMIN ELECTRIC MFG. CO., Des Plaines, Ill. *New York, Chicago, San Francisco*

BENJAMIN REFLECTORS

TRADE MARK

FLOODLIGHTS . . . PANELBOARDS . . . FITTINGS . . . SIGNALS

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MOTOR BRUSH REPLACEMENTS

A Brush Kit for Every Purpose

Ohio No. 1 Kit for all small motorized appliances.

Ohio Vacuum Cleaner Service Kit No. 10.

Ohio No. 45 Kit for Refrigerator Motors.

Ohio No. 35 Kit supplies brush replacements on four popular makes of single phase motors.

See Your Jobber or write directly to

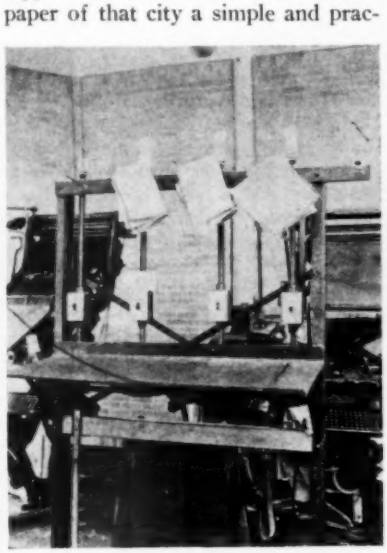
THE OHIO CARBON CO.
12504 Berea Road Cleveland, Ohio

outlets for changed locations of sorting machines, single-phase motor installations or other miscellaneous outlets. The combination is made up of a 4 in. galvanized octagon outlet box for concrete work and a special cast-iron cadmium plated backplate. This

backplate is made with a ⅜ in. fixture stud, three ¾ in. knockouts and a floor outlet extension nipple tapped for ¾ in. conduit. Extension nipples are carefully set to finish flush with concrete floor. A ¾ in. flush brass plug is screwed into this extension nipple which is removable for the future insertion of ¾ in. conduit. Open ceiling conduit extensions are made with a 4 in. extension ring attached to original ceiling outlet in concrete slab.

PRINTING PLANT WORK-IN-PROGRESS SIGNAL

The Arft-Killoren Electric Co., Appleton, Wis., installed for a newspaper of that city a simple and prac-

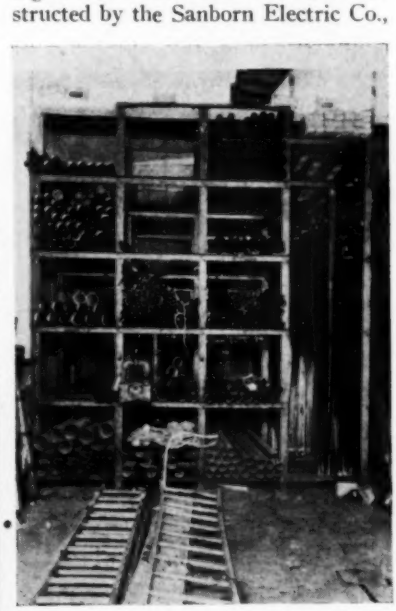


Composing Room Signal Station

tical signalling system used to inform the editorial and composing departments of the progress being made on copy by linotype operators. A steel box equipped with four sockets each lamped for a different color is mounted at editor's desk. Four sockets with similarly lamped colors are mounted upon a desk-like work table in the composing room. A tumbler switch is mounted in an exposed conduit fitting beneath each work table socket, wired to control one composing room signal light and its companion light at editor's desk. The four switches and lights at composing room work table are spaced in vertical alignment with four spindles upon which four classes of copy, coded per lamp color scheme, are filed. When linotype operators have completed the set-up of any particular color group of copy, the lamps at editor's desk and composing room table for this color are switched off. The progress and type of uncompleted work in composing work is readily visible at editor's desk by the number and color of lighted signal lamps.

CONDUIT STORAGE RACK

To accommodate their conduit and metal molding stocks comprising conduit sizes up to 5 in. and two molding sizes, a steel frame rack was constructed by the Sanborn Electric Co.,



Indianapolis, Ind. A space was framed from wall to wall with steel racks to ceiling, providing 17 compartments for horizontally stored sizes and two full depth compartments for vertical storage of ½ in. and ¾ in. conduit. Three sets of 1½ in. by 3 in. vertical channel irons in six rows form the compartment tier spacers, to which are bolted 1½ in. by 2½ in. horizontal angle irons. To avoid possible settling of vertical supports an 18 in. concrete base was provided for the entire storage space.

Panther & Dragon Tapes

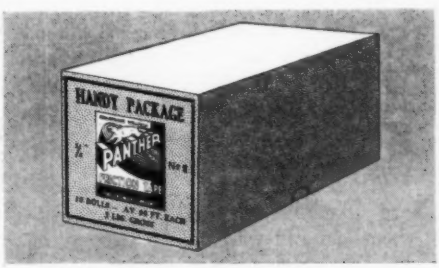
Backed by Long Experience

Panther Friction Tape. Nos. 8, 4, 2, and 1 in individual boxes.

Panther Display Rack. Contains 10 pounds of Nos. 8, 4, 2, and 1 Panther Tape.

Panther and Dragon Friction and Rubber Tapes are outstanding among commercial tapes because they are backed by the reputation and experience of the Okonite Company, for over fifty years a leader in the insulation field. This background accounts for such features as longer life, greater tensile strength and adhesiveness, freedom from ravelling, and stronger distinctive green cores. It accounts for the up-to-the-minute merchandising value of the striking Modern Package and displays, and for the protection of the Cellophane wrapping sealed around each roll, a feature originated by Panther and Dragon. Send for the Panther-Dragon Booklet and ask for further details.

Sold Only Through Wholesalers



Handy Package. Contains 10 unboxed rolls of Panther Tape, Nos. 8 or 4.

Dragon Rubber Tape. Nos. 8 and 4 only packed in individual boxes.

Panther Counter Display. Contains 16 rolls of Panther No. 2.

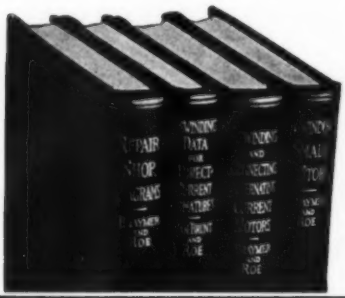
Panther Counter Display. Contains 32 rolls of Panther No. 1.

HAZARD INSULATED WIRE WORKS

Division of

THE OKONITE COMPANY

Factories: Wilkes-Barre, Pa. Passaic, N. J.



NOW—this
ELECTRIC MOTOR REPAIR LIBRARY
tells how to handle all kinds of profitable repair and rewinding jobs

Do you know how to:

—lay out a wave winding
—test a.c. and d.c. motors to locate grounds, shorts, opens, quickly and positively
—properly record data when stripping armatures so that it will be instantly usable for correct rewinding by yourself or any experienced winder at any time afterward
—determine how many coils can safely be cut out
—lay out single-phase fan motor windings
—change single-phase windings for two- or three-phase operation
—make cross or equalizer connections on lap windings
—lay out frog-leg windings
—handle every step in a rewinding job from the time it comes into the shop until it leaves
—wind stators for turbogenerators
—band high-speed armatures
—rewind motors for voltage, speed, frequency, or cycle changes
—etc., etc., etc.

1,079 pages of practical shop methods and data on jobs like these in this library. A complete, modern key to repair of all motors. Nothing else in it; every page filled with definite, practical facts for the industrial maintenance man and the electric shop worker.

4 volumes, $10.00, payable in easy monthly installments

THIS set of books should be on the shelf of every man who ever has to touch a motor for purposes of repairing it or changing it to meet different operating conditions. In shop language and with practical shop methods it covers every step in stripping, rewinding and connecting a.c. and d.c. motors of all kinds.

How to change motors for different operating conditions

Here is all the information you need in order to determine what changes various types of motors permit; to lay out new windings for specified service conditions; and to handle every step in the work with satisfactory results.

Covers all types of motors, from those used in small household and commercial appliances of all kinds, to mining and railway motors. Explains principles underlying the different types of windings; gives definite instructions for doing the various rewinding jobs. Also gives many data, tables and diagrams constantly needed by the repair man, including data difficult to get from any other sources.

Low price—easy terms—10 days' examination on approval

Bought separately the books in this Library would cost you $11. By using this coupon you need pay only $2.00 in 10 days and $2.00 monthly until the special price of $10.00 is paid. In addition, we give you 10 days in which to examine the books. Send no money; simply fill in and mail the coupon now; let us know your answer after you have seen the books.

McGraw-Hill Book Co., Inc.,
330 W. 42nd St., N. Y. C.

Send Electric Motor Repair Library for 10 days' examination on approval. In 10 days I will send $2.00, plus few cents postage, and $2.00 monthly for four months, or return books postpaid. (We pay postage on orders accompanied by remittance of first installment.)

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NEWS MANUFACTURERS

A DEPARTMENT FOR THE ANNOUNCEMENT OF ACTIVITIES OF MANUFACTURERS THAT ARE OF INTEREST TO CONTRACTORS, SUCH AS CHANGES IN EXECUTIVE PERSONNEL, BRANCH OFFICES, NEW PRODUCTS, ETC.

CENTRALIZED AGENCY TO COVER NEW YORK LIGHTING MARKET

H. H. Roberts and Company, Inc., a new sales agency specializing in lighting equipment, announces the establishment of headquarters at 142 Duane St., New York City. The combined lines of a selected group of nationally known manufacturers covering the complete lighting field will be warehoused for the convenience of jobbers and contractors of the Metropolitan New York area. A sales and engineering force will be maintained to promote these combined lines with architects, engineers and purchasers, on the basis of rendering a complete lighting service from one medium. Hamilton H. Roberts, New York sales manager of the Wheeler Reflector Company for the past ten years, is president of this new organization.

Catalog No. 160 covering Dayton V-flat drives has just been published by The Dayton Rubber Manufacturing Co., Dayton, Ohio. In addition to general data contained in the catalog, speed ratios, pulley diameters and V-flat belt sizes and center distances are contained. V-pulley prices, dimensions and weights are also given in the catalog, with photographs showing the construction of the drives.

Porcelain Products, Inc., Findlay, Ohio has released a 16-page booklet entitled "Distribution Cutouts". This booklet covers their complete line of enclosed type distribution cutouts and contains information on construction details, listing the different sizes of cutouts. Cross arm hangers and fuse links are also contained in the booklet. The catalog is profusely illustrated and two pages are devoted to fuse characteristics.

WESTINGHOUSE LAUNCHES LIGHTING SALES PLAN

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., aims to establish 500 dealerships among utilities, lighting specialty houses, contractor-dealers and stores to sell better lighting for factory, office, store and home. The lighting division and the Westinghouse Lamp Company have combined forces for a concerted cultivation of this market.

Westinghouse dealers will be provided with light meters and special demonstrating equipment with which to make individual surveys. A handbook of tables and instructions, combined with a catalog describing all Westinghouse industrial and commercial lighting equipment will be furnished all dealers, also a lighting demonstration album and a sales manual. Direct-mail pieces and other promotion material, a "plan of action book" and sales training schools to be conducted by the various Westinghouse distributors, are other steps in this campaign.

R. J. Roy, formerly of the Cleveland office of the Fairbanks-Morse Company, has been appointed manager of the Allen-Bradley Company's branch office at 1836 Euclid Avenue, Cleveland, Ohio.

Hatfield Wire and Cable Co., Hillside, N. J., announce the addition of H. C. Gump to its sales staff, as assistant to J. S. Jacobson, district manager for the middle west territory.

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Having Trouble Choosing Floodlights?

★ Perhaps We Can Help You ★

For railroad yards, large areas, buildings, rear-door relamping, 1500 watts

Price to contractors
2AL24CBV1 $105.00

For buildings, large areas, railroad yards, cast-aluminum, 1500 watts

Price to contractors
2AL34CBV1 $84.00

For sports fields and large areas, open-type, up to 4000 watts

Price to contractors
2AL51CAM1 $31.80

For sports fields, filling stations, etc., open-type, up to 1500 watts

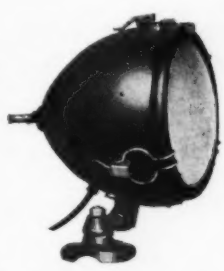
Price to contractors
2AL45AAM1 $12.00

For buildings, sports fields, constructions projects, etc., copper-bronze, 1000 watts

Price to contractors
2AL31ECA1 $51.00

For buildings, towers, stacks, etc., copper-bronze, 500 watts

Price to contractors
2AL30EAA1 $36.00



For buildings, signs, towers, etc., copper-bronze, 200/250 watts

Price to contractors
2AL29CAC1 $28.20

For buildings, signs, towers, etc., cast-aluminum, 200/250 watts

Price to contractors
2AL38BBA1 $20.40

Submersible projectors, cast-aluminum, 250/400, and 500/1500 watts

Price to contractors
2AL33EDL1 $28.20
2AL41DAA1 $63.00
(Also available in cast-bronze)

For all types of lighting up to 200 feet, sheet-aluminum, up to 1000 watts

Price to contractors
2AL43CAB1 $19.20

Handy units for small areas, sheet-aluminum, 100/150, and 200 watts

Price to contractors
2AL35AAB1 $3.90
2AL36AAB1 $6.30

WE shall be glad to send you reprints of this advertisement with either prices to contractors or list prices. Descriptive publications on any or all of the above units are available. Address General Electric, Dept. 6A-201, Schenectady, N. Y.

500-115

GENERAL ELECTRIC

September New Products

D. C. Time-Switch

Sangamo Electric Co., Springfield, Ill., announces its form TW electrically wound time-switch for use on d.c. service only. Equipped with jeweled balance and omitting device as standard design, an advanced time cut-off is optional. Manual operation may be employed without disturbing sequence. A dust-proof mounting enclosure is provided with three conduit pryouts at bottom. Manufacturer offers this less expensive unit where the required accuracy of timing does not justify the use of a full jeweled device.

Solderless Lugs

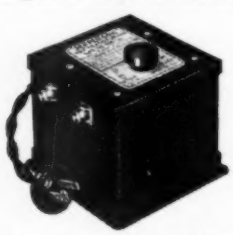
Reliable Electric Co., 3145 Carroll Ave., Chicago, Ill., announces its line of single-hole straight solderless lugs, ranging in conductor size from No. 8 to 500,000 c.m. Terminals are made of commercially pure copper, with clamping yokes of high strength bronze, designed to hold together in one piece. Manufacturer claims that these lugs may be easily installed with a wrench or pliers, so as to withstand severe vibration tests without loosened contact, and that they maintain cooler operating temperatures than well soldered lugs and are easily inspected after installation.

"Oversize" Underfloor Duct

A super fiberduct raceway for underfloor wiring introduced to provide greater wiring capacity for such installations as the laboratories and shops of high schools and technical schools has been announced by the General Electric Co., Merchandise Department, Bridgeport, Conn. This "oversize" raceway has a cross-sectional area of 5 sq. in. and accommodates 144 pairs of No. 22 twisted wire. The capacity, therefore, is considerably larger than that of the standard size duct which has a cross-sectional area of 3 sq. in. and carries 84 pairs of the same wire. The duct is of the oval-top and closed-bottom type. It is supplemented by a complete line of junction boxes, couplings, etc., similar to those used for standard sizes of fibre underfloor duct.

Toy Transformer

A line of toy transformers designed to permit unusually fine steps of geared dial voltage control is announced by the Jefferson Electric Co., Bellwood, Ill. The Jefferson geared dial delivers secondary voltages in average steps of fifteen one-hundredths of a volt (.15 volt). The geared voltage device is completely enclosed in the transformer housing. Manufacturer claims that the short steps of control assure a steady flow of power, avoiding a drop-back to zero at each step, and eliminates the need of a separate rheostat in the secondary circuit. Design and construction is claimed to be both electrically and mechanically liberal and sturdy to withstand toy service.



Open Fuse Cutouts

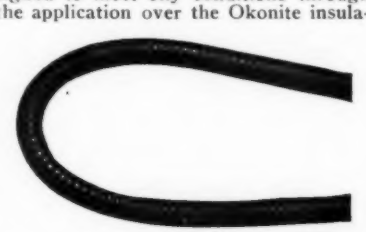
General Electric Co., Schenectady, N. Y., announces a line of open fuse cutouts with drop-out fuse holders which permit with three units a choice in range to suit distribution circuits up to 15,000 volts. These units are rated at 5,000, 7,500/125,000 Y. and 15,000 volts, can be fused from 1 to 100-amps. and have an interrupting capacity of 2,000 amp. (R.M.S.). They are provided with a drop-out feature which gives linemen positive indication of open circuits. The fuse holder can be removed or installed with a standard switch hook, and an automatic latch prevents the holder from falling out of the support during the expulsion recoil. Fuse links can be quickly and easily installed and fuse-holder tubes, made of weather-resistant vulcanized fibre over which is wound linen base textolite, can easily be replaced without renewing the metal parts of the fuse holder. The 100-amp. fuse holders are interchangeable, for the same voltage ratings, with the fuse holders used in 60-amp. cutouts of the same type which were previously announced.

Midget Panelboard Plier

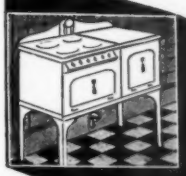
A thin, slim jawed plier especially designed for use in panelboard, switchboard and radio work is announced by J. H. Williams & Co., Buffalo, N. Y. This plier known as Midget "Superplier" No. 1519 is 4½ in. long overall and has a 4-position slip-joint which provides a jaw opening range from 0 to 9/16 in. with the jaws parallel at the most important openings, thus claiming a minimized injury to nuts. Made of drop-forged chrome-alloy steel, heat-treated, this plier is supplied in chrome-plated finish.

Oilproof Portable Cord

Thiokol-sheathed portable cord, known as "Oilproof Okocord" is announced by the Okonite Company, Passaic, N. J. This cord is particularly designed to meet oily conditions through the application over the Okonite insulation of a belt of synthetic compound known as Thiokol, in which an open mesh seine twine braid has been imbedded in order to reinforce the sheath and to prevent kinking of the cord. Okocord can be supplied in single or multiple conductors, the latter with different colored insulations to indicate polarity. Manufacturer claims that the "normal expectancy of life" of this cord will not be affected by exposure to oil or grease and that other characteristics are its resistance to ozone and to corrosive acids and gases. It is claimed to remain flexible and serviceable at temperatures as low as 20 deg. F. and that it does not crack or check when exposed to the sun's rays. A test report made after 30 days' immersion in gasoline claims that the diameter of Oilproof Okocord was practically unchanged whereas a 60 percent rubber-sheathed cord similarly immersed increased in diameter 55 percent.



Cut Your Cost of Range Installations



ARROW BAKELITE RANGE OUTLET

Straight-in Wiring
Solderless Connections
Insure
Faster, Easier Wiring

INSIDE VIEW Showing Wiring

No. 7950

No. 7951

ECONOMY OF INSTALLATION comes first in the design of this Outlet. Wires enter *straight in* to the solderless connections.

This arrangement gives more wiring room; makes for ease and simplicity of connections, even in this *smaller-size* Outlet. ¾" and 1" knockouts allow wiring from bottom or back.

A cable clamp is built in, interchangeable for bottom or back wiring. Separate ground strap (No. 7951) is available when metallic cable is used. . . Made of black Bakelite, No. 7950 is embellished on modern lines attractively in harmony with the up-to-date kitchen. It is engineered with the primary purpose of helping you sell MORE range outlet installations. Ask for data-sheet.

ARROW ELECTRIC DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

September New Products

Range and Light Panel

A dead-front combination range and lighting circuit distribution panel with integral fused main service switch is announced by the Trumbull Electric Manufacturing Co., Plainville, Conn. The design of buss connections provides for

sequence current flow (meter, switch, fuses) to meet the requirements for power company range campaign installations. Each unit comprises four 30-amp. 125-volt, 2-wire solid neutral branch lighting circuit connections, and two 60-amp. 125/250 volt solid neutral fusible dead-front "Pull Switch" type circuits, one for service entrance and one for range circuit. Solderless connectors are provided on the 60-amp. terminals. Testing facilities are provided since all live wires and terminals are covered by removable shields. The unit is available for flush or surface mounting finished black enamel, and is 7¼ in. wide, 12⅞ in. high and 4 in. deep. A total of 15 conduit knockouts are provided at ends, sides and back of box, varying in size from ½ to concentric ¾ in. by 1 in. by 1¼ in.

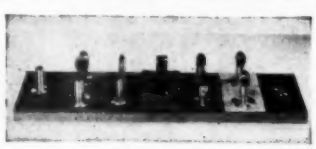
Automatic Motor Starter

Across-the-line type automatic starters claimed to be designed to prevent accidental starting, and to permit full capacity motor operation without danger of overload burnouts, are annouced by the Lincoln Electric Co., Cleveland, Ohio. Unintentional starting of the

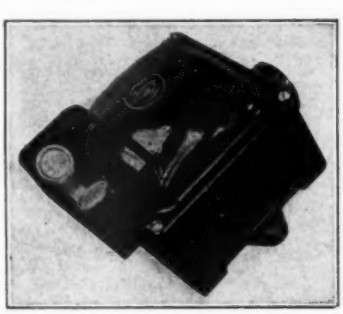
motor as would be caused by a bump or fall against the control buttons would move only the stop button, which extends around and beyond the start button. The recessed start button must be pressed in with the fingertips. Inverse time limit overload protection may be calibrated to full motor capacity with allowances for carrying a small overload for a long time or a very heavy load for a short time. These starters are made in three types, and for 3 to 10 h.p. at 110 volts and up to 30 h.p. at 220, 440 or 550 volts. Mechanical parts are cadmium plated, moving contacts are removable without tools, and stationary contacts can be removed by the use of a screwdriver. The manufacturer claims ease of starter installation; ease of replacing switch, due to its being held to back of case by one screw and its being also removable without disturbing conduit connections; long life of contacts through their wiping action, plus the use in the large 220-volt sizes of cadmium plated steel shields for thermal and magnetic arc quenching.

Tumbler Switch Guard

An easily attached guard, designed to protect the triggers and mechanism of relatively exposed flush tumbler switches against damage due to destructive blows, has been introduced by the General Elec-



tric Company, Merchandise Department, Bridgeport, Conn. The device, made of heavy brass with side rails which shield the trigger, is conveniently mounted on the flush plate simply by removing the screws holding the plate to the switch and then attaching guard and plate by means of the same screws. Finished in brush brass, the guard is listed as Catalog No. GS 29W1.



Motor Control Push-Button

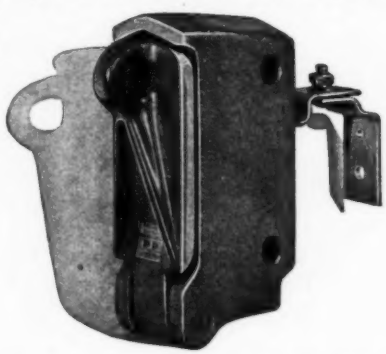
A line of double-unit momentary contact motor control stations for dust-tight and vapor-proof use is announced by the Electric Controller and Manufacturing Co., Cleveland, Ohio. Two type J button-operated units are mounted together in one case, thus permitting the simultaneous operation of two circuits by a single lever, or the mechanically interlocked, individual operation of first one circuit and then the other. Available in three forms of terminal and switch operation sequence, a total of 12 different control circuits may be obtained. Specific button markings are available in addition to the conventional "on" and "off" markings. The enclosing case is 5¾ in. wide by 5 13/16 in. long by 3⅝ in. deep. A ¾ in. threaded conduit hub is provided at one end and flat back mounting ears are at sides. The cover is provided with a guard around the operating lever, with a hole in each side of guard for padlock.

Non-Corrosive Conduit Fittings

A complete "Simplet" line of cadmium finished malleable iron conduit fittings which are claimed to offer complete protection against corrosion has been announced by Simplet Electric Co., 5100 W. Ravenswood Ave., Chicago, Ill. It is claimed that this cadmium finish will not chip or break under heavy blows or scratches. Large and easily accessible wiring spaces for wire pulling, combined with great strength yet light weight are further claims made for these fittings.

Porcelain Distribution Cutouts

A line of high-tension wet-process porcelain distribution cutouts and fuse links, ranging in size from 1 amp. up to 150 amp. and from 2500 volts up to 12,500



volts, has been announced by Porcelain Products, Inc., Parkersburg, West Va. These cutouts are designed for outdoor mounting and are available in 5 cross and hanger styles, made of mild steel hot dipped galvanized fittings. The design of enclosing body, together with a solid porcelain door is claimed to provide high flashover values, low surface leakage and high corona formation voltage, combined with maximum resistance to shattering and falling of the pole when subjected to the most extreme short-circuit conditions. Other features advanced for these cutouts include cast red bronze tubular line connectors with Monel metal binding screws; non-corrosive solid type door aligning hinge, with phosphor bronze side play springs, free of radio interference; self-aligning pure drawn copper contact shoes; horn fibre fuse explosion tube with moldede bakelite protective wrapping.

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names
that have
made
history..
Daniel Boone
(Born 1735—Died 1820)
American hunter and pioneer who became famous for his defense of the early frontier settlers against the marauding Indians. He, with fifty white men, successfully defended Fort Boonesboro against a large force of Indians. He was elected to the Hall of Fame in 1915.
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There are instances in history when the pioneer who blazed the trail did not carry through and continue to give and receive the benefits of his pioneering. This, of course, is not true of the COLT NOARK line of Safety and Meter Switches; here the pioneer is going forward and rendering increased service to all users of the products.

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Eliminating the expense and bother of solder, flux, tape and iron heating, their "four joints per minute" speed means a substantial saving in time—a surprisingly large saving in wiring costs. Similar in principle, IDEAL Thread Lugs effect like savings wherever lugs are necessary.

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City ..... State .....

Benjamin Electric Mfg. Co., Des Plaines, Ill., has released a 24-page bulletin No. 7 listing its line of Benjamin "Nofuze" circuit breaker load centers, panelboards and switchboards. Layout information for special and convertible distribution panelboards is quite extensively outlined in this new bulletin.

Gruber Bros., 72 Spring St., New York City, announces Catalog No. 34 illustrating its line of GGG lanterns, tavern and grill room lighting fixtures, and contemporary flush lighting.

Cutler-Hammer, Inc., Milwaukee, Wis., announces its descriptive bulletin No. 511 covering a new line of small a.c. and d.c. solenoid operated brakes, ranging in torque ratings from 3 lbs. ft. to 75 lbs. ft. Applications suggested for these brakes are machine tools, small hoists, dumb-waiters, laundry equipment, etc.

Harold E. Trent Company, Philadelphia, Pa., manufacturers of electric furnaces and heating units, announce the opening of an office at 143 Liberty St., New York City with A. H. Gurtner in charge.

American Steel & Wire Company, Chicago, Ill. has just published Bulletin No. 100, which is a 4-page pamphlet covering concentric armored service entrance and service drop cables. The pamphlet is illustrated and contains specifications of this type of cable.

Announcement has been made of the appointment of Frank A. Nealon as general sales manager of the American Enameled Magnet Wire Company, Port Huron, Michigan, manufacturers of magnet wire in all insulations, automotive cables, radio, transformer and antenna wire and coils. Mr. Nealon was formerly sales manager for the Sterling Cable Corporation.

General Kontrolar Company, Inc., Dayton, Ohio, announces new quarters for its Telechime division eastern sales offices in the County Trust Building, 265 West 14th St., New York City, with F. V. L. Smith in charge.

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ALL TYPES
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Saves you real money on every job that requires fastening conduit to masonry and concrete.

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IN these days of reduced office help and constantly changing costs, it is almost impossible for any individual to keep abreast of the price changes on the thousands of items used in the electrical contracting business, yet every *guess* on prices is a *bad guess*—a probable source of loss.

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Assure Contractors Both a Good Margin of Profit and Satisfied Customers

A high quality time switch adapted to many applications.

Equipped with Waltham, time tested clock movement and self-starting synchronous motor and mercury enclosed contact switches.

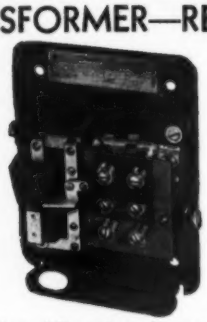
Gives accurate electric time as well as dependable switch control

Has 24 hour rotating rim on which "on" and "off" clamps are easily set (independent of time setting) to control predetermined time switching.

Various models available for different requirements.

Write for Bulletin No. 115.

MERCOID TRANSFORMER—RELAY



Something different and more efficient than the average make of relays employing the conventional clapper type iron armature.

All noises and residual magnetism are eliminated. It is in principle a low voltage transformer, but also acts as a repulsion-relay and therefore requires no externally connected transformer.

It is highly recommended wherever a thoroughly dependable remote control is required. Write for bulletin No. 110.

Mercoid Controls Are Distributed and Stocked in Many Cities By The Graybar Electric Co., Inc.

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Sole Manufacturers of The Mercoid Switch
4223 Belmont Avenue, Chicago, Illinois

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The Best and Safest Method is a properly installed KNOB and TUBE job. Be sure and get the

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Assembled Knob because it "HAS A GRIP LIKE ITS NAMESAKE."

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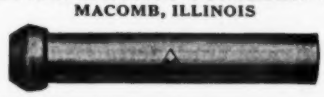

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Sherman Soldering Lugs are superior to any others. They are seamless all around. The solder cannot leak out at closed end, making a messy job and wasting solder. Better conductivity is also secured. In sizes 15/16" O.D. and up, Sherman Soldering Lugs are made only of seamless copper tubing of exactly correct gauge—made for the purpose. Sherman Soldering Lugs are listed as approved by the Underwriters' Laboratories.

Center Formed Lug U. S. Pat. No. 14401 — Side Formed Lug U. S. Pat. No. 14401

H. B. SHERMAN MFG. CO.
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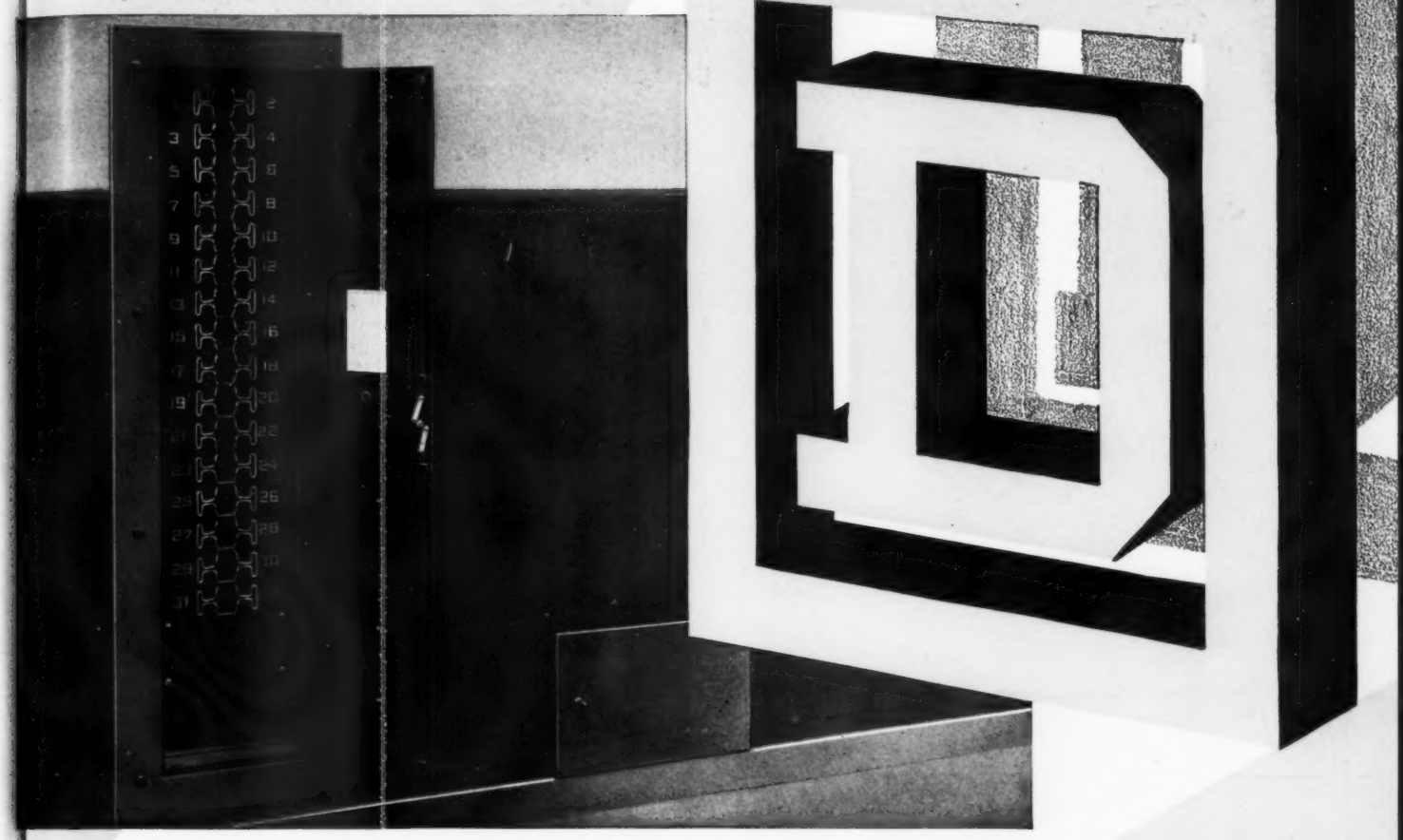
Square D Saflex Convertible Panel



ONE OF MANY DETAILS WHICH HAVE BUILT SQUARE D

■ A Large Manufacturer* of cut gears, speed reducers, etc., gave his reasons for using Square D distribution panels.

"In various departments of our plant we have Square D convertible panels, some 44 circuit, some 22 circuit. All are 500 ampere capacity, 220 Volt, 3-phase. The Square D boards are the only ones we have seen where the fuse sizes can be changed in a matter of minutes—say from 30 ampere capacity to 100 amperes. Only five minutes are required to make the complete change for a 3-phase circuit. Loosen a few screws; change fuse clips; put in new fuses and tighten screws. The changes are made without shutting off the power. These features add greatly to the flexibility of the distribution system. The same advantages apply to any repairs or replacements."

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*Manufacturer's Name upon request.

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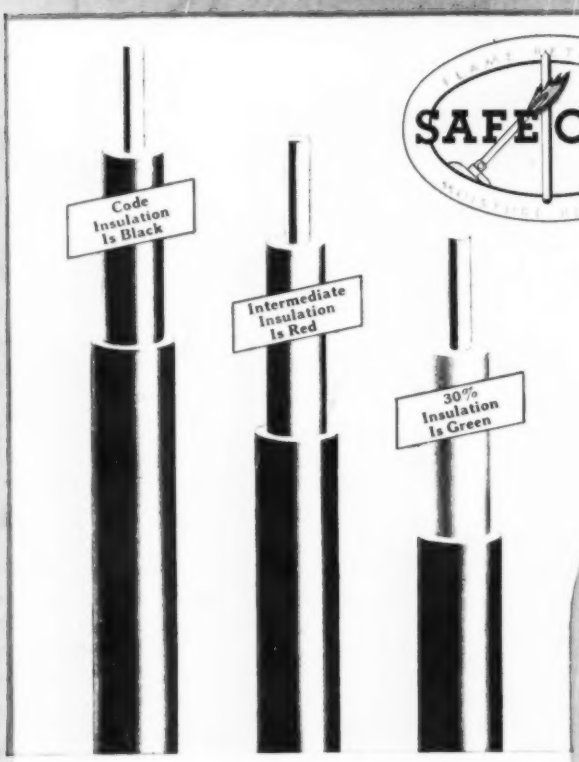

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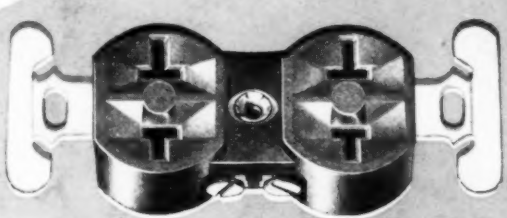

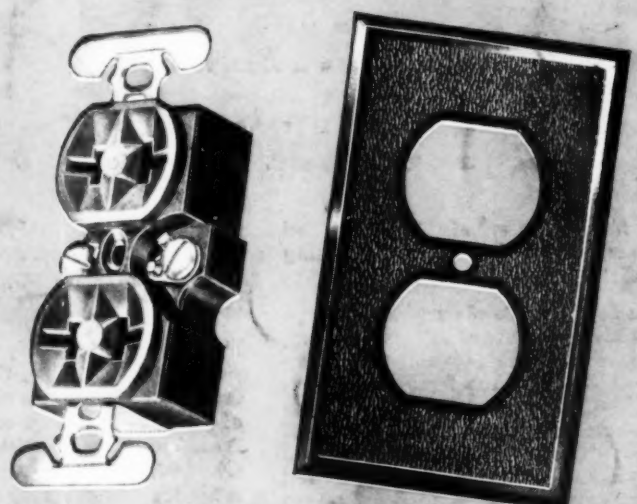

Samples and information of the products mentioned above may be obtained from your G-E Merchandise Distributor or by writing Section DW-199, Merchandise Dept., General Electric Co., Bridgeport, Conn.

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MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT

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